Coal Age

APRIL, 1944

modern coal production number

How to Increase Output • Cut Costs
Improve Quality • Promote Safety

HERE IS A *"Complete Lubrication Plan"* THAT WILL

HELP YOU SAVE EQUIPMENT... PRODUCTIVE TIME... LABOR

Your equipment must last through the war . . . into the conversion period . . . and far beyond. Breakdowns and "wear-outs" must be sidetracked with efficient maintenance—proper lubrication.

That's the purpose of this SAVE and SERVE plan . . . to place in your hands the "know-how" of proper lubrication . . . to help you establish the practice of proper lubrication throughout your plant.

This plan is practical and easy to use. It has been prepared by Sun Lubrication Engineers to give you the benefit of their broad experience. The SAVE and SERVE Plan includes plant poster, wall chart, lubrication manual, technical bulletins, performance folders and maintenance memos. It will aid every man in your plant who is concerned with the operation of machinery to make it run better and last longer.

Put Sun's SAVE and SERVE Plan to work in your plant! It's yours for the asking, to help you save vital equipment . . . productive time . . . and labor. Write today for the folder which gives you the complete details . . . tells you how to get all of the material.

SUN OIL COMPANY • *Philadelphia 3, Pa.*

Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

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SUN INDUSTRIAL PRODUCTS

Helping Industry Help America

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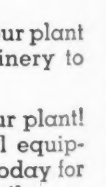

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Send folder describing your SAVE and SERVE Plan.

NAME: .....

TITLE: .....

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ADDRESS: .....

TECHNOLOGY DEPT.

In war or peace
B.F.Goodrich
FIRST IN RUBBER

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APR 24 1944
DETROIT

Ore-unloading cord belts by B. F. Goodrich outperformed former belts more than 100%

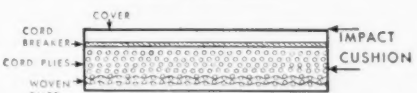
Double the tonnage carried for 25% increase in belt cost

THE average tonnage record for conveyor belts on these ore unloaders was 3,490,000 tons — until the first B. F. Goodrich cord conveyor belt was installed at the opening of the 1939 lake season. Because the cost of the B. F. Goodrich belt was 25% greater, the owner knew it would have to carry 4,300,000 tons to earn its premium price.

Today, after five full seasons of use the belt has carried *7,500,000 tons — and is ready for further regular service this spring.* Two other cord belts, installed later, have carried 6,000,000 tons and 5,100,000 tons. They, too, are ready for continued heavy-duty service.

The diagram shows why B. F. Goodrich cord belts outperform ordinary belts by such a great degree.

OLD TYPE BELT

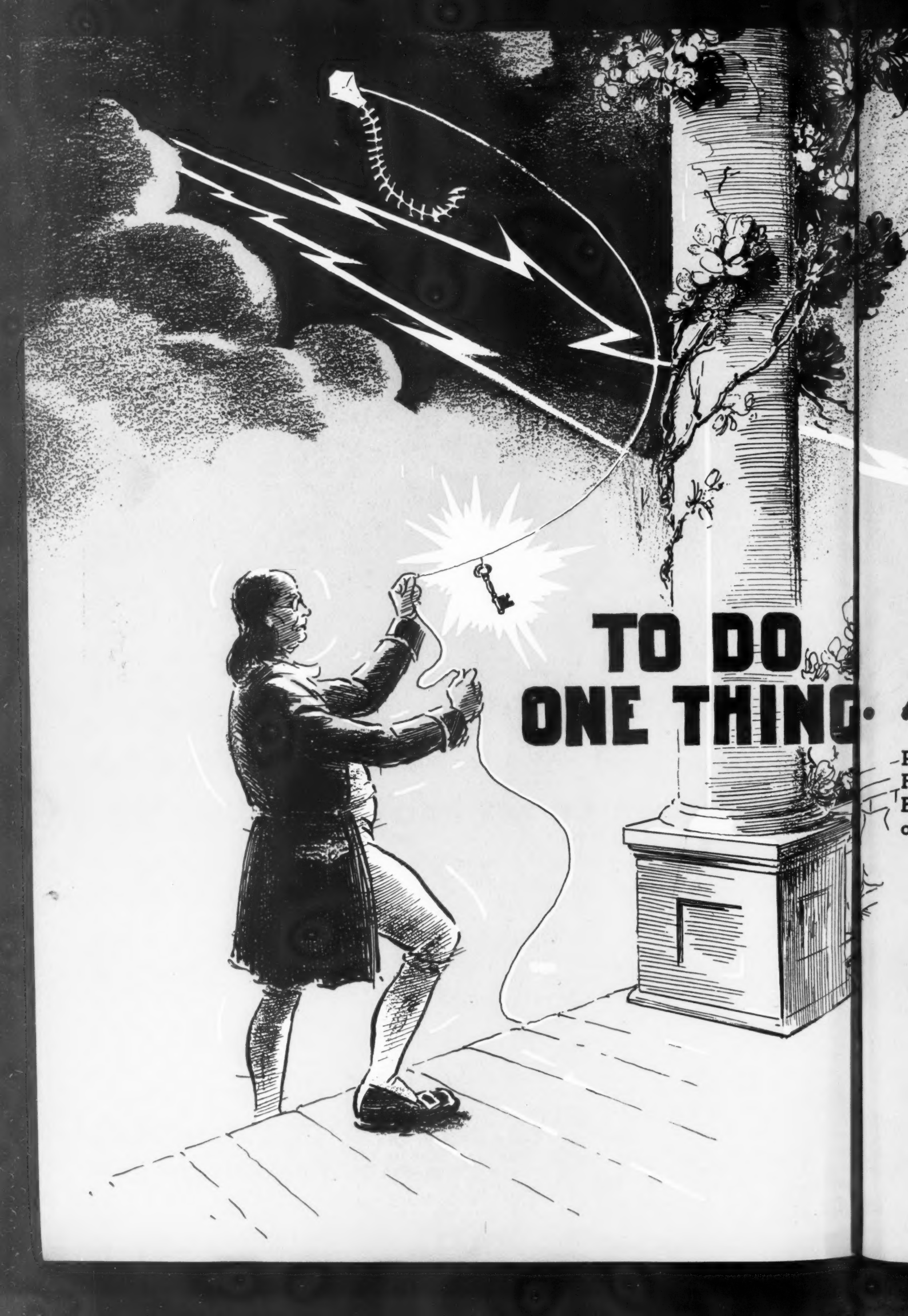


B. F. GOODRICH CORD BELT

Note the cord plies made up of individual cords encased in rubber. In effect, they double the thickness of the impact cushion and because impact resistance varies as the *square* of the cushion thickness, resistance is increased *from 4 to 6 times.* Note the cord breaker running *across* the belt. That permits a spreading action that resists the cutting and gouging of heavy lumps striking the belt at the loading point. Belt life is greatly increased; ply separation practically eliminated.

B. F. Goodrich cord belts, now being made of synthetic rubber, can be used for all kinds of conveyor jobs. They are especially important for the really hard jobs that quickly ruin ordinary belts. If you have such a job in your conveyor system, ask the nearest B. F. Goodrich representative for complete information. Or write, *The B. F. Goodrich Co., Industrial Products Division, Akron, Ohio.*

B.F. Goodrich
Cord Conveyor Belts


TO DO
ONE THING

. AND DO IT SUPREMELY WELL!

Philadelphia and BENJAMIN FRANKLIN and the discovery of Electricity are linked in the minds of all men everywhere.

Philadelphia and HULBURT and QUALITY GREASE are linked in the minds of experienced users of coal mine equipment.

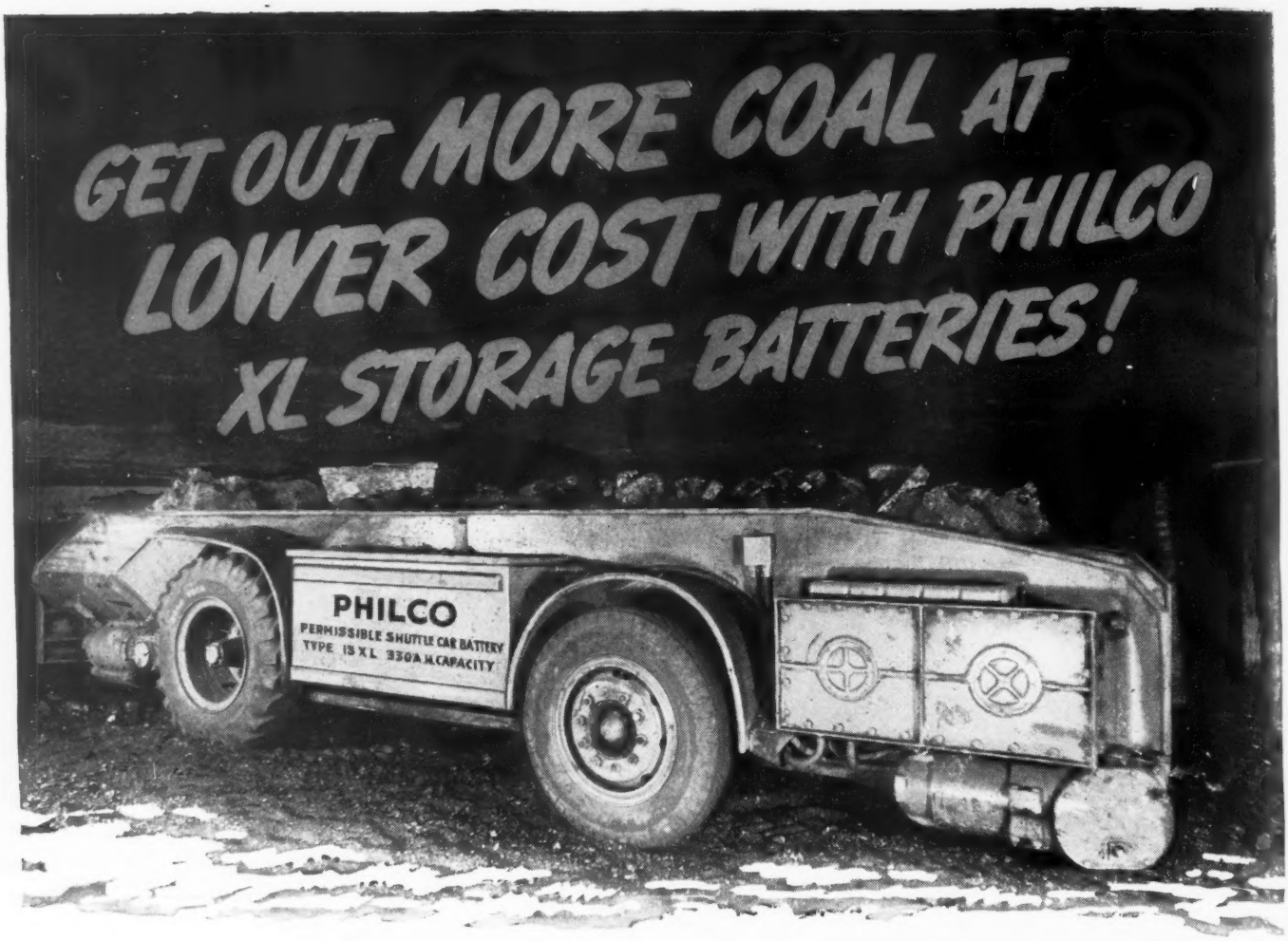
HULBURT

OF PHILADELPHIA

Quality GREASE

HULBURT
OIL & GREASE COMPANY
Specialists in
Coal Mine Lubrication

GET OUT MORE COAL AT LOWER COST WITH PHILCO XL STORAGE BATTERIES!



Heavy-duty Philco XL Batteries will keep your Joy Shuttle Cars or mine locomotives on the go 10% longer between charges! Plate for plate, Philco XL Batteries pack 10% greater capacity at no increase in overall size. They'll give you sustained high voltage and extra wallop, too . . . the kind of power that gets out more coal at lower haulage cost per ton!

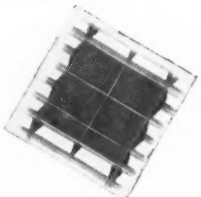
Today Philco is set up to give you better service than ever before. Our storage battery production capacity has been *tripled*—that's why you get far better than average deliveries from Philco. Write for the Philco Mine Battery catalog.

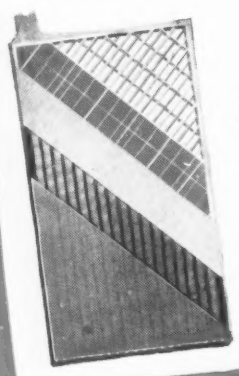
PHILCO CORPORATION, STORAGE BATTERY DIVISION
TRENTON 7, NEW JERSEY

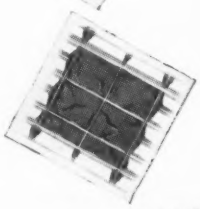
BACK THE ATTACK—BUY WAR BONDS

10% GREATER CAPACITY...SUSTAINED HIGH VOLTAGE...LONG PRODUCTIVE LIFE

(*Upper right*) Philco "K" Process produces a flint-hard, porous plate with superior bond between active material and grid. (*Lower right*) Ordinary plate drying.







(*Left*) Philco Triple Insulation adds months of service by sealing active material into grid with Glass Fibre Mats, Slotted Rubber Retainers, rugged Philco Separators.

SPECIFY RUGGED, HIGH-CAPACITY

PHILCO

MINE LOCOMOTIVE AND SHUTTLE CAR

BATTERIES

Coal Age

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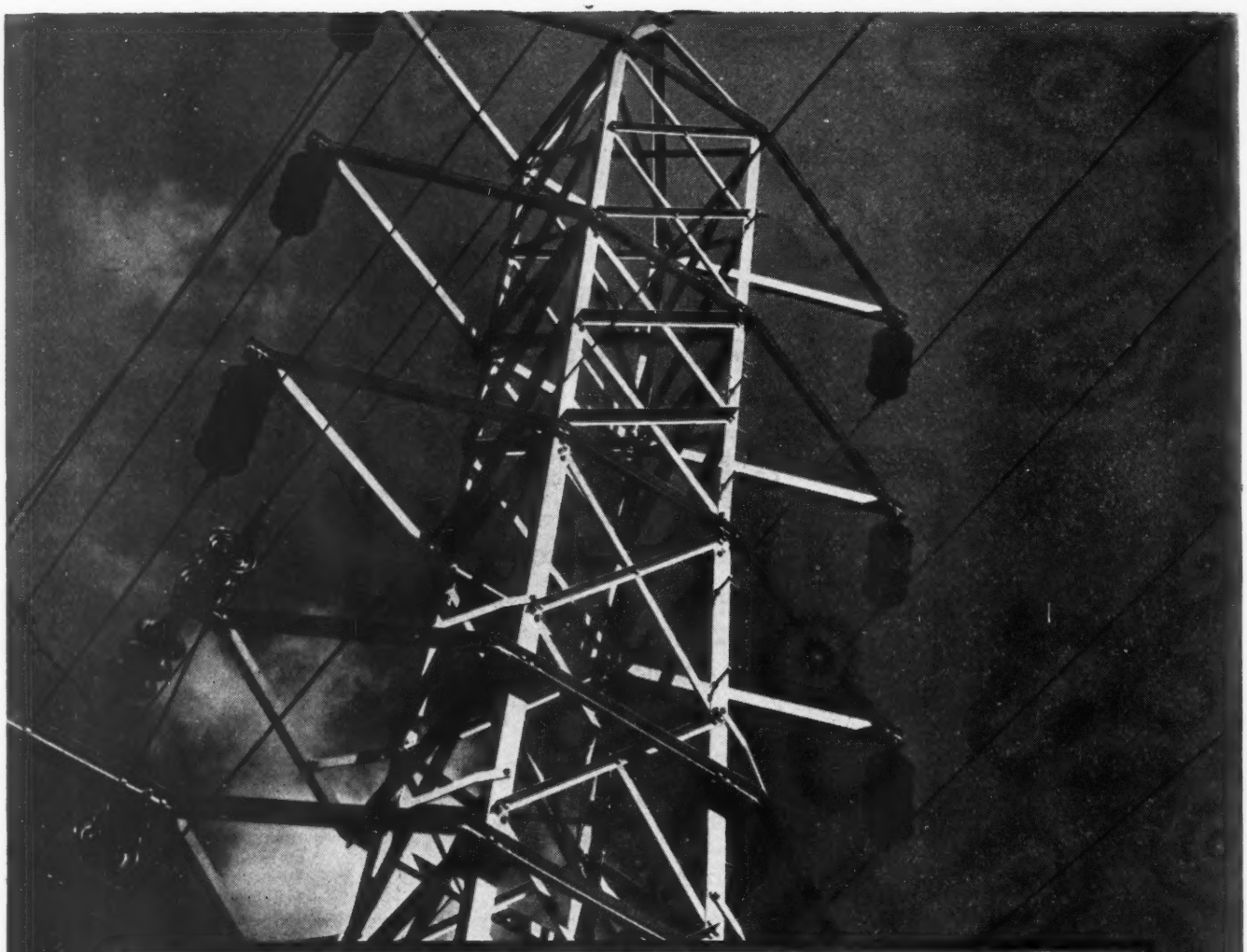


WHERE DOES AMERICA GET MOST OF ITS ELECTRIC POWER?

Prepare yourself for a surprise.

Every time most people switch on a light, listen to the radio, or use a percolator or any other electrical appliance, they are burning bituminous coal.

For most electric power comes from coal—which means, of course, bituminous coal.

For one thing, a ton of water would have to drop a mile to generate the same amount of energy as there is in a pound of coal, properly burned.

For another, an electric power plant which uses coal ordinarily costs only about one-third as much to build as a hydroelectric plant having the same capacity. And in most parts of the country it is usually much more economical to carry coal from the mine to the place where it is needed to make electric power than it is to transmit the same amount of electric energy from a power dam.

These are only two of the many reasons why bituminous coal is "No. 1 Public Energy"—America's most important source of heat and power.

And, knowing this, the men who operate the bituminous coal mines have a keen sense of responsibility to the nation, to their customers, and to the men who work for them.

BUY MORE WAR BONDS

BITUMINOUS COAL *Institute*

60 East 42nd Street, New York 17, N.Y.

1 START HOLES MORE QUICKLY

2 SPEED THE WORK ALL THE WAY

3 CUT COST'S AS YOU GO

LIGHT WEIGHT

COALMASTER tubular alloy steel augers are light and free running—easy to handle—resulting in less driller fatigue, and a saving in man-energy.

ACCURATE ALIGNMENT

From thread bar to bit—smooth, vibrationless operation—clean holes drilled straight.

HEXANSPEED COUPLING

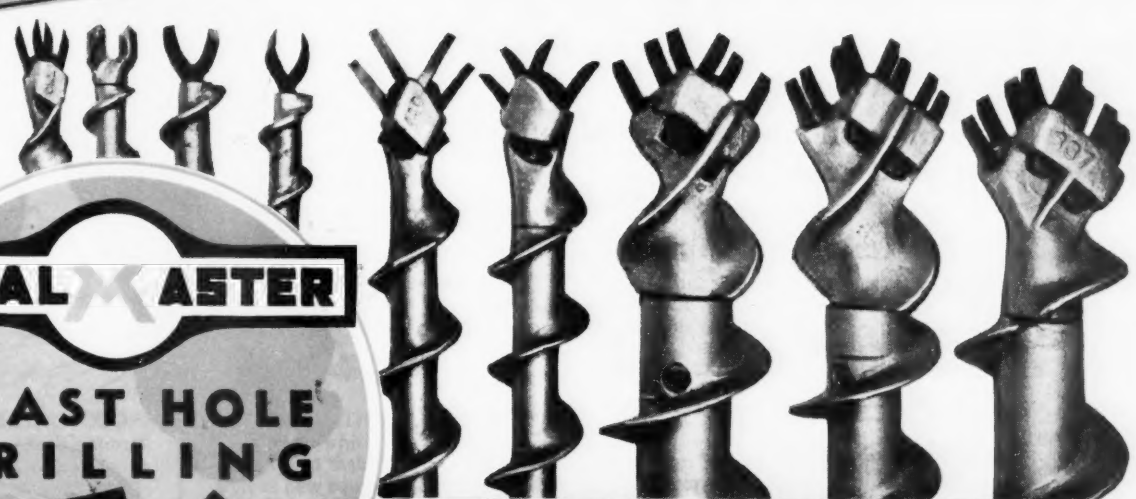
The COALMASTER quick make and break auger coupling reduces auger changing time to a minimum, and speeds up coal production 10 to 30 percent.

COALMASTER MATCHED SETS

Auger, head, and bit are engineered to produce maximum results in the shortest time at minimum cost.

INVESTIGATE COALMASTER equipment as an answer to your drilling problems.

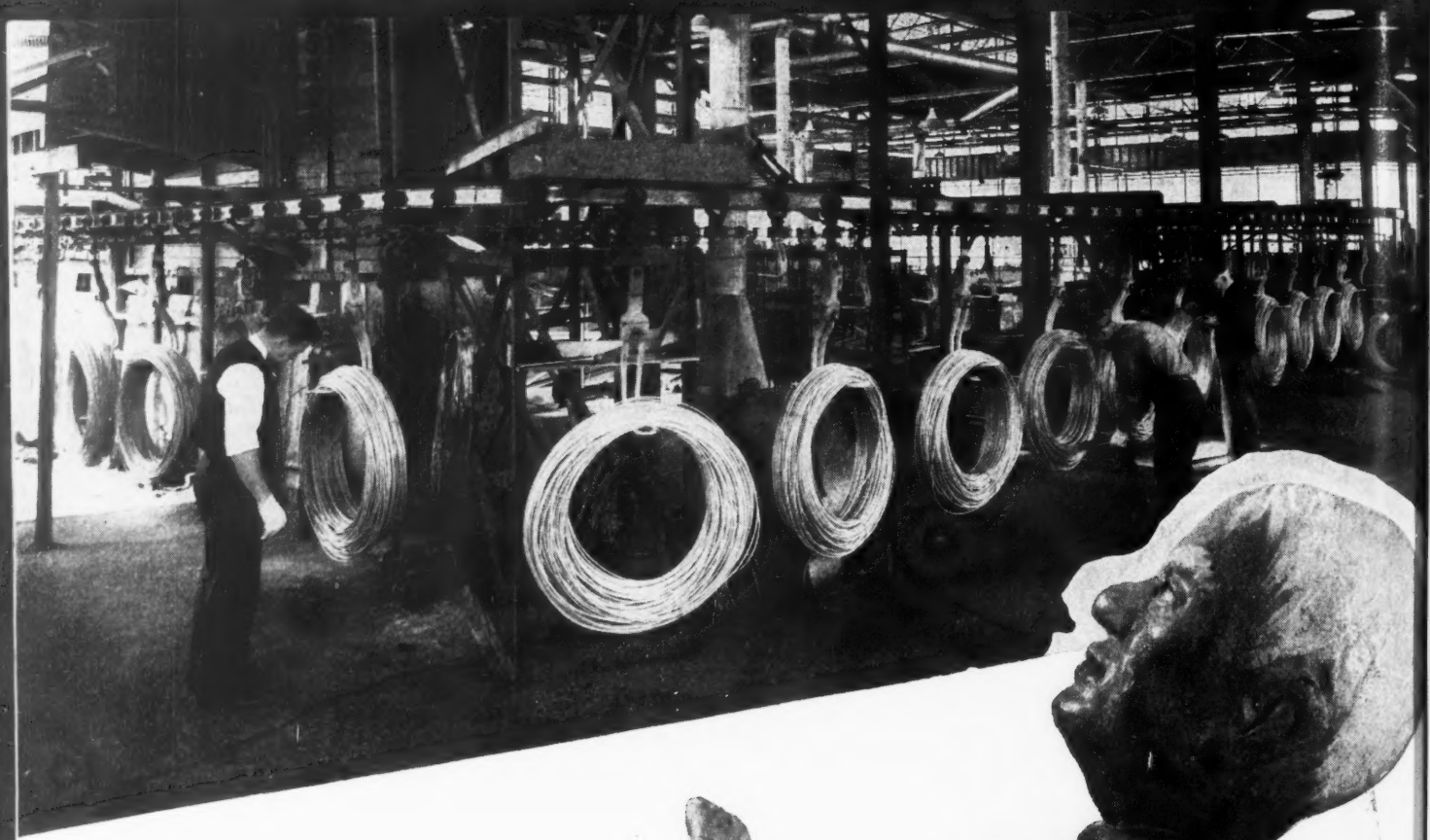
COALMASTER TOOLS are made in sizes from 1½" up—to drill correct holes for all powder—CARDOX, AIRDOX, Hydraulic, and special requirements. They are made in types for Handheld Drills—for Post and Machine-mounted Drills—for Strip Pit Drills.

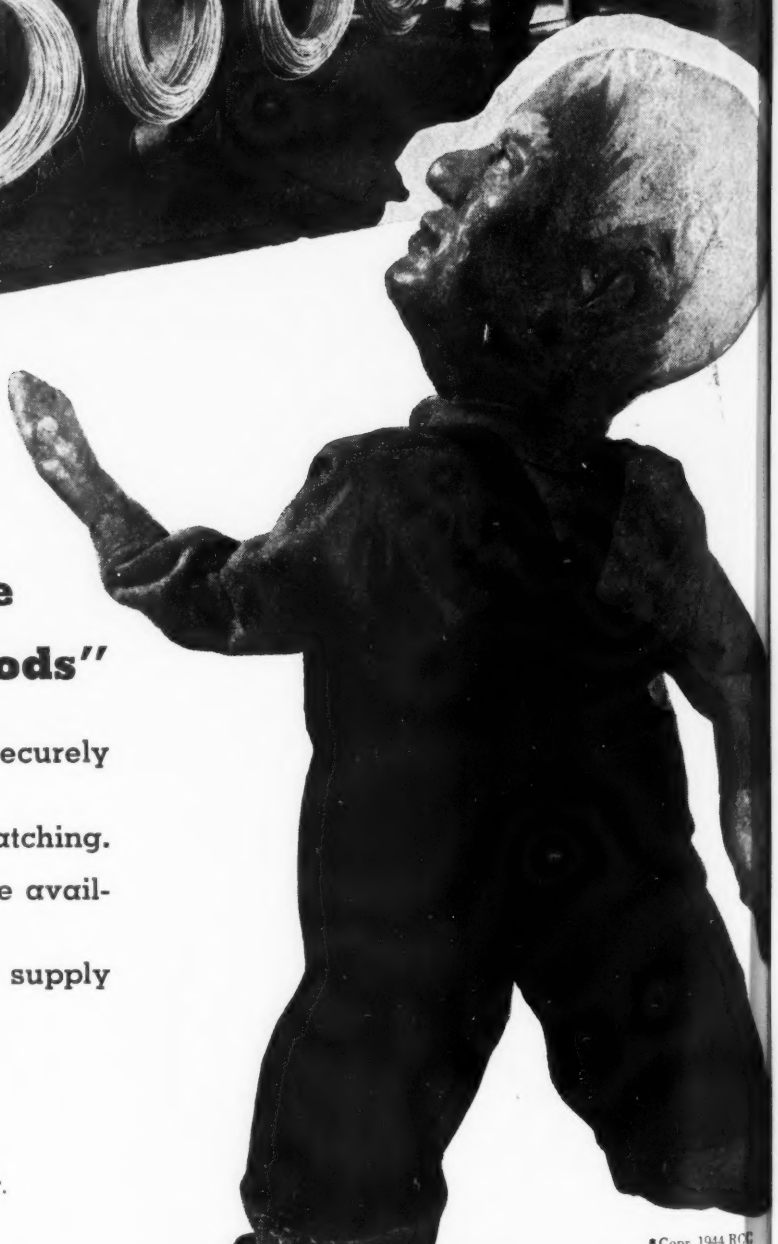


COALMASTER

BLAST HOLE DRILLING Tools

CENTRAL MINE EQUIPMENT CO.
ST. LOUIS, MO.





*Rōmey says,

"This is the way we handle copper rods"

Every coil is inspected, cropped and securely tied while on the conveyor chain.

This eliminates all scraping and scratching.

We have bare and weatherproof wire available for quick shipment.

Count on us as a reliable source of supply for your wire and cable needs.

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ROME CABLE CORPORATION

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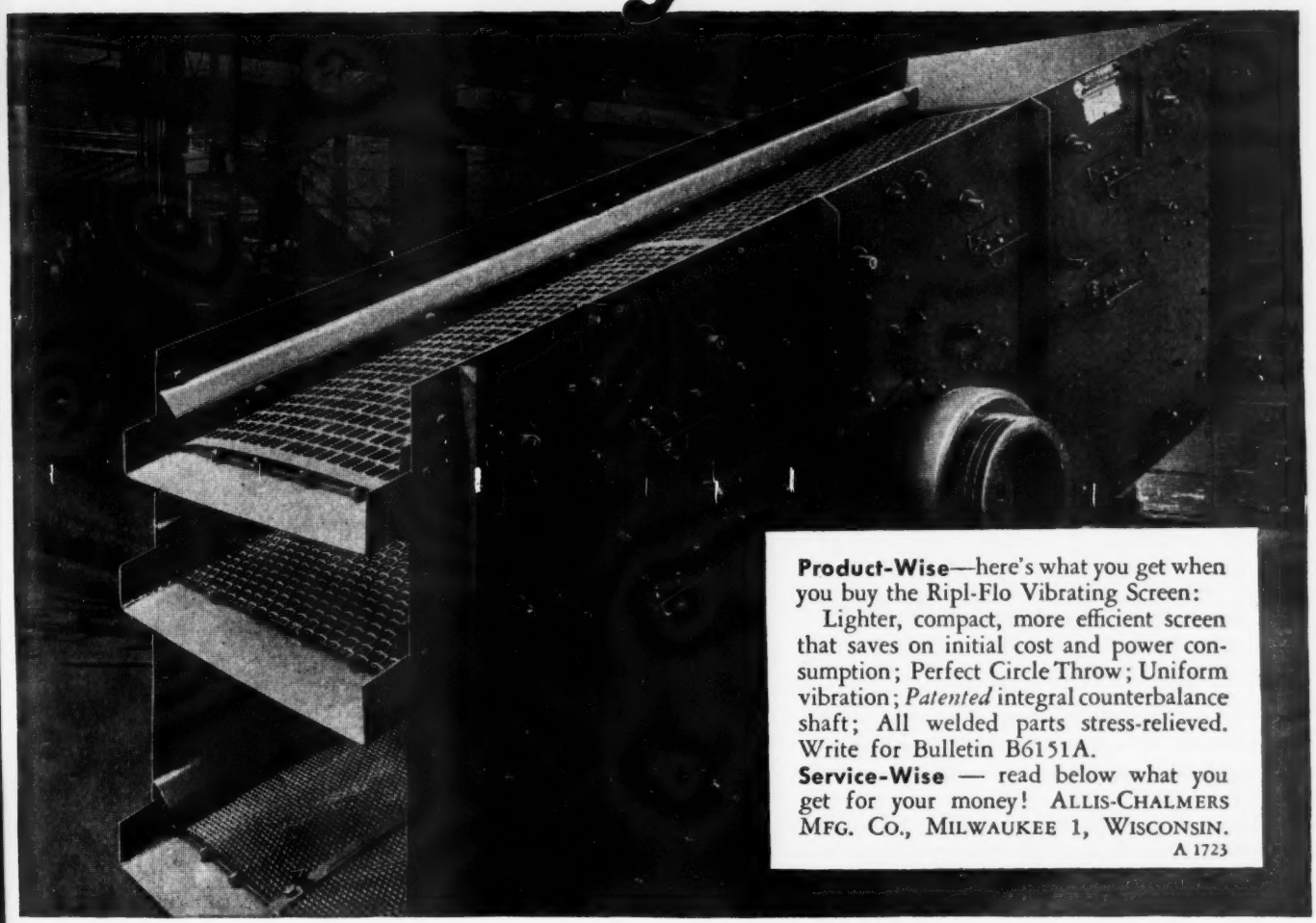


Product-Wise—here's what you get when you buy the Ripl-Flo Vibrating Screen:

Lighter, compact, more efficient screen that saves on initial cost and power consumption; Perfect Circle Throw; Uniform vibration; *Patented* integral counterbalance shaft; All welded parts stress-relieved. Write for Bulletin B6151A.

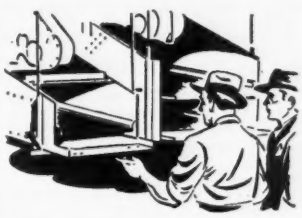
Service-Wise — read below what you get for your money! ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WISCONSIN.

A 1723

You Get This!

1 ENGINEERING COOPeration — Allis-Chalmers engineers work directly with your staff. Result: No guesswork when you specify A-C.

2 PRODUCTION ANALYsis—in which A-C looks for ways to make *existing* as well as new equipment "team up" for greater production.



3 UNBIASED RECOMmendation—building the world's largest line of basic processing goods, A-C supplies *exact* equipment you need.

4 PREFERRED REPAIR service—such orders are tagged "emergency", are expedited at A-C. In most cases we ship from stock.

ALLIS-CHALMERS

Basic Processing Equipment for Food, Chemical, Coal, Rock, Metal and Allied Industries

CAN ONE BATTERY DO THE WORK OF TWO ?

What Happened When An Electrician Tried To Find Out

Early in 1941, an industrial plant converted to war production and changed from an 8-hour to a 24-hour day. But when the Edison field engineer recommended spare batteries for the industrial trucks, the plant electrician replied "We don't need spare batteries. We'll find enough time for charging during lunch periods and early morning hours. We know our Edison Batteries can 'take it' even if we overwork them." And in this he persisted in spite of every warning.

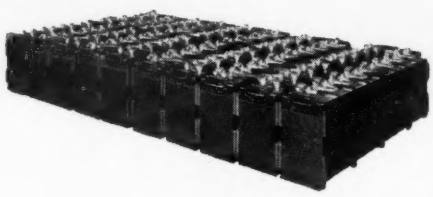
Then, two years later, he told the Edison field engineer that the batteries were not holding up. At the field engineer's recommendation tests were conducted, and the batteries delivered 110 per cent of rated capacity. This finally convinced the electrician that, although the batteries were "taking it" as he had insisted they would, there simply was not enough time for charging and he agreed at last that he needed spares to keep his trucks in 24-hour service.

The fact that these batteries did "take it" as the electrician expected is no argument for trying to make one battery do the work of two. It is, however, an impressive demonstration of dependability under intolerable conditions, and it testifies to that reserve of dependability which alkaline batteries have available under all conditions.

Some of the unique characteristics of the Edison Alkaline Battery which account for its extraordinary performance are cited in the column at the right.

EDISON STORAGE BATTERY DIVISION
THOMAS A. EDISON, INCORPORATED, WEST ORANGE, NEW JERSEY

Edison
ALKALINE BATTERIES



ADVANTAGES OF THE EDISON ALKALINE BATTERY IN MINE LOCOMOTIVES AND SHUTTLE CARS

★ It is durable mechanically. High strength steel construction is used in the containers, grids, pole pieces, etc. The electrolyte is a preservative of steel.

★ It is foolproof electrically. It may be accidentally short-circuited, over-charged, over-discharged, or even charged in the reverse direction without injury.

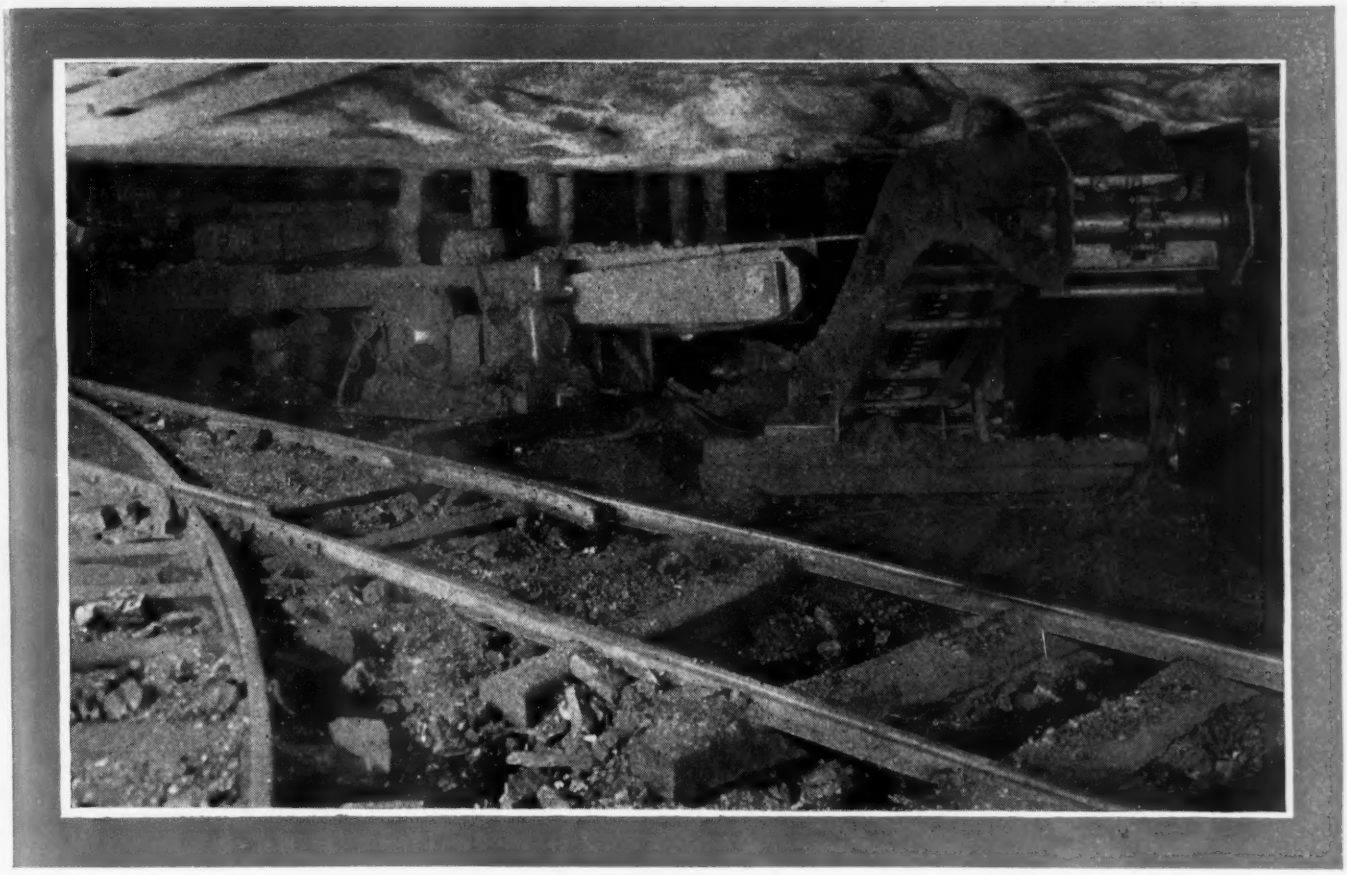
★ It can be charged rapidly. It does not require critical adjustment of charge rates and, therefore, can be charged directly from the d-c mine power supply. It has no finish-rate limitations. It requires no equalizing.

★ It withstands temperature extremes. It is not damaged by freezing. Free air spaces on all sides of all cells provide ventilation for rapid cooling under high temperature conditions.

★ It is simple to maintain. Merely charge adequately, add pure water, keep clean and dry.

★ Its tray assembly and cell connections are extremely simple.

★ Its life is so long that its annual depreciation cost is lower than that of any other type of storage battery.



. . . you'll never discard an SK motor!

MORE WESTINGHOUSE SK MOTORS ARE USED IN COAL MINES THAN ALL OTHER MAKES COMBINED

AMPLE DESIGN—guts to carry the heavy loads—rigid one-piece frame with feet welded to frame to provide rigid integral foundation—uniform magnetic path aids commutation.

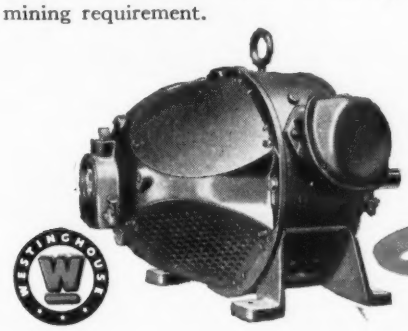
SPECIALLY DESIGNED INSULATION—field coils wound on rigid Micarta spool—vacuum-impregnated with hydrolene gum—eliminates air pockets. Mica-insulated armature coils—form-wound on all except the smaller ratings—protect against moisture or dust—prevent electrical breakdown.

EXCLUSIVE WESTINGHOUSE VESTIBULE SEAL—keeps lubricant in—dust and dirt out.

GREATER ACCESSIBILITY—brushes, brushholders and commutator readily accessible—permits easy brush adjustment or renewal—brushes readily "sanded-in".

WIDE RANGE OF RATINGS—from 1 to 200 hp to meet every mining requirement.

You'll never need to—for SK Motors never go out of date. During the thirty-odd years that SK Motors have been built, the basic construction has never been changed. Certainly, the appearance has changed, and new sizes have been added, but today's vastly improved parts will fit *any* SK Motor of the same rating and frame size ever built. No wonder these motors have outsold all other makes combined for mining service—they've been the standard in the coal industry since 1911. Here's performance which is unsurpassed for dependability and economical service. See your nearest Westinghouse representative or write for Descriptive Bulletin 3500-1. Westinghouse Electric & Manufacturing Company, Dept. 7-N, East Pittsburgh, Pa. J-94603

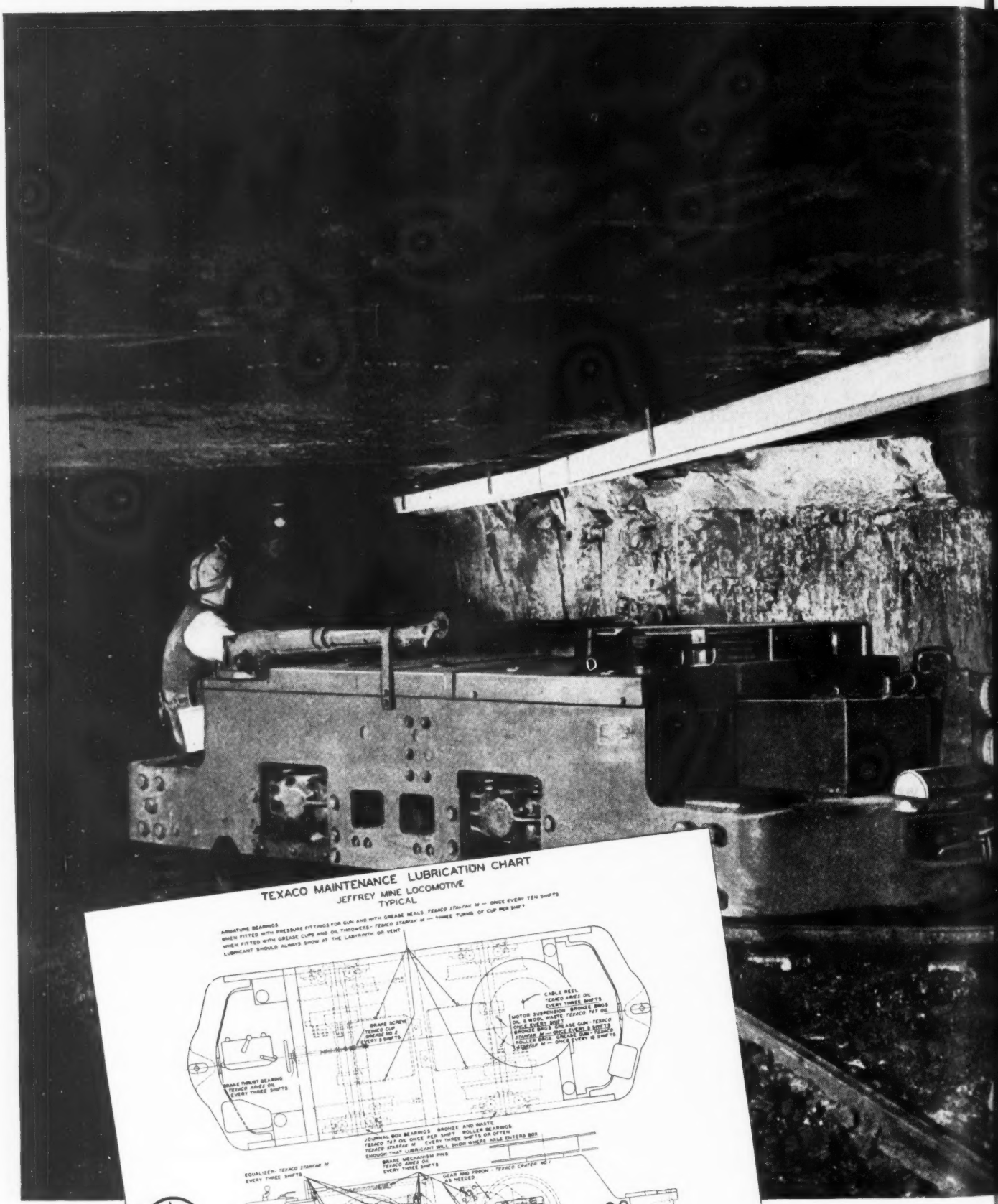


SK

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MINING MOTORS


TEXACO MAINTENANCE LUBRICATION CHART
JEFFREY MINE LOCOMOTIVE
TYPICAL
ARMATURE BEARINGS
WHEN FITTED WITH PRESSURE FITTINGS FOR GUN AND WITH GREASE SEALS TEXACO STARFAK M — ONCE EVERY TEN SHIFTS
WHEN FITTED WITH GREASE CUPS AND OIL THROWERS - TEXACO STARFAK M — THREE TURNS OF CUP PER SHIFT
LUBRICANT SHOULD ALWAYS SHOW AT THE LABYRINTH OR VENT
CABLE REEL
TEXACO ARMEX OIL
EVERY THREE SHIFTS
MOTOR SUSPENSION
OIL & WOOL WASTE
BRONZE BRGS
TEXACO 747 OIL
ONCE EVERY SHIFT
BRONZE BRGS GREASE GUN - TEXACO
STARFAK M — ONCE EVERY 5 SHIFTS
ROLLER BRGS GREASE GUN - TEXACO
STARFAK M — ONCE EVERY 10 SHIFTS
BRAKE SCREW
TEXACO CUP
GREASE NO 2
EVERY 5 SHIFTS
BRAKE THRUST BEARING
TEXACO ARMEX OIL
EVERY THREE SHIFTS
JOURNAL BOX BEARINGS BRONZE AND WASTE
TEXACO 747 OIL ONCE PER SHIFT ROLLER BEARINGS
TEXACO STARFAK M EVERY THREE SHIFTS OR OFTEN
ENOUGH THAT LUBRICANT WILL SHOW WHERE AXLE ENTERS BOX
BRAKE MECHANISM PINS
TEXACO ARMEX OIL
EVERY THREE SHIFTS
EQUALIZER- TEXACO STARFAK M
EVERY THREE SHIFTS
GEAR AND PINION - TEXACO CRATER NO 1
AS NEEDED
THIS DIAGRAM SPECIFIES TYPICAL PERIODS OF LUBRICATING FOR ORDINARY CONDITIONS FOR SPECIAL CONDITIONS LUBRICATE ACCORDINGLY

FREE — Texaco Maintenance Lubrication Charts that show clearly not only where to use Texaco *Marfak*, but when and *with what* lubricant to service each lubrication point in all leading makes of cutters, loaders, locomotives, etc. Order Charts by make and model.

TEXACO
REG T M

QUOTA – 686 MILLION TONS

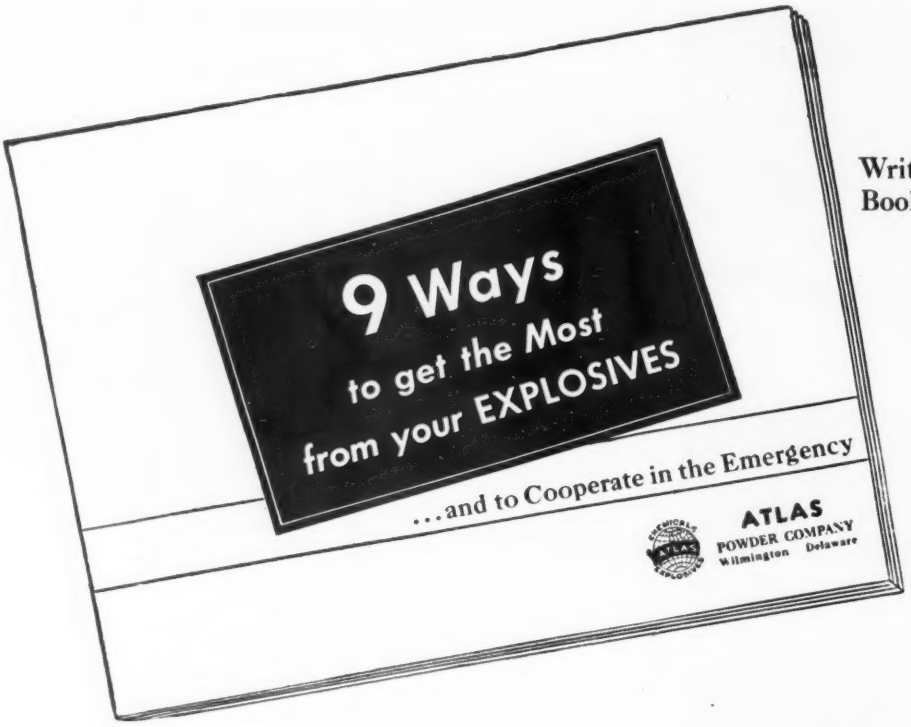
IT'S a big order . . . this year's coal requirements, and the only way to fill it is to keep present mining machinery on the job.

Mine operators everywhere are increasing tonnage through effective lubrication . . . the kind they get with Texaco.

Texaco Marfak, for example, in both anti-friction and plain bearings of locomotives, cutters, loaders, shuttle cars, etc., provides ideal film lubrication inside the bearing, yet maintains its original consistency at the outer edges . . . sealing itself in, sealing out coal dust, dirt and water. Its tough adhesive film cushions against shocks, and makes parts last longer.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, *National Sales Division,* Dept. C., 135 East 42nd Street, New York 17, N. Y.

TEXACO MARFAK



Write for this ATLAS Booklet Today!

How to Shoot for Greater Tonnage

Producing maximum coal tonnage under wartime conditions—hampered by aging equipment and a manpower shortage—is a tough job. You'll appreciate the practical suggestions offered in this 12-page Atlas booklet.

Save man-hours. Produce a higher tonnage of quality coal. Make the explosives do a bigger job. Write today for your free copy of "9 Ways to get the Most from your Explosives." Facts on—

- *Correct Cartridge Diameter*
- *Drill Hole Size*
- *Proper Stemming*
- *Better Blasting with Square Cuts*
- *Cleaning Out "Bug Dust"*
- *Priming*
- *Loading and Tamping*
- *Drill Hole Spotting*
- *Four Modern Methods of Cushioning*

Here's a valuable blasting aide for the coal mine's "High Command" and its lieutenants. This booklet has been especially useful at safety meetings. Send for it.

Buy War Bonds

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

O-B Fused Trolley Tap Protection Works Two Ways---

SIMPLE, Fool-Proof Design---Only Four Major Parts

LIGHT WEIGHT and Easy To Handle--Weighs But Slightly More Than Two Pounds

LOW COST--Dimes Spent For Fused Tap Protection Save Many Dollars Of Expensive Cable Replacement

Safeguards Workmen Against Electrical Hazard

Protects Expensive, Hard-To-Get Cables From Burnout

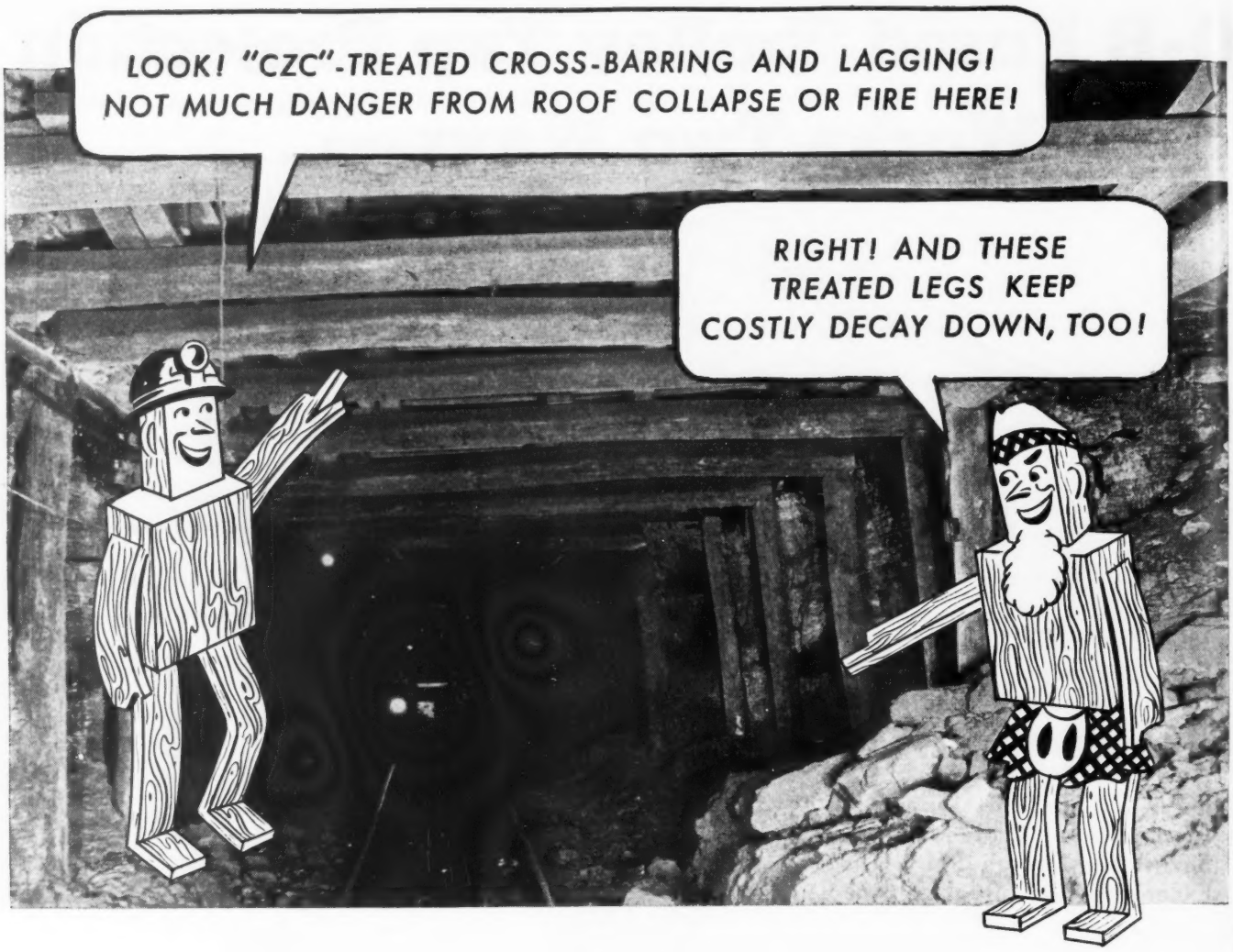
Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

KEEP BUYING WAR BONDS

Write For Booklet 744M


LOOK! "CZC"-TREATED CROSS-BARRING AND LAGGING! NOT MUCH DANGER FROM ROOF COLLAPSE OR FIRE HERE!
RIGHT! AND THESE TREATED LEGS KEEP COSTLY DECAY DOWN, TOO!

SPECIFY "CZC"-TREATED TIES & TIMBERS FOR SAFER, MORE ECONOMICAL MAINTENANCE
1. Resist decay
2. Reduce fire hazards
3. Have no odor
4. Are safe to handle

MINE FIRES are less likely to happen when timbers and ties are treated with Du Pont Chromated Zinc Chloride. And there is less chance of accidents resulting from decay-weakened timbers. These are two important reasons why mine men everywhere are insisting upon "CZC"-treated ties and timbers.

You can cut maintenance costs—eliminate early and frequent replacements with "CZC"-treated ties and timbers. Get *all* the facts on wood preservation for mines. Write E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Delaware.

DU PONT CZC

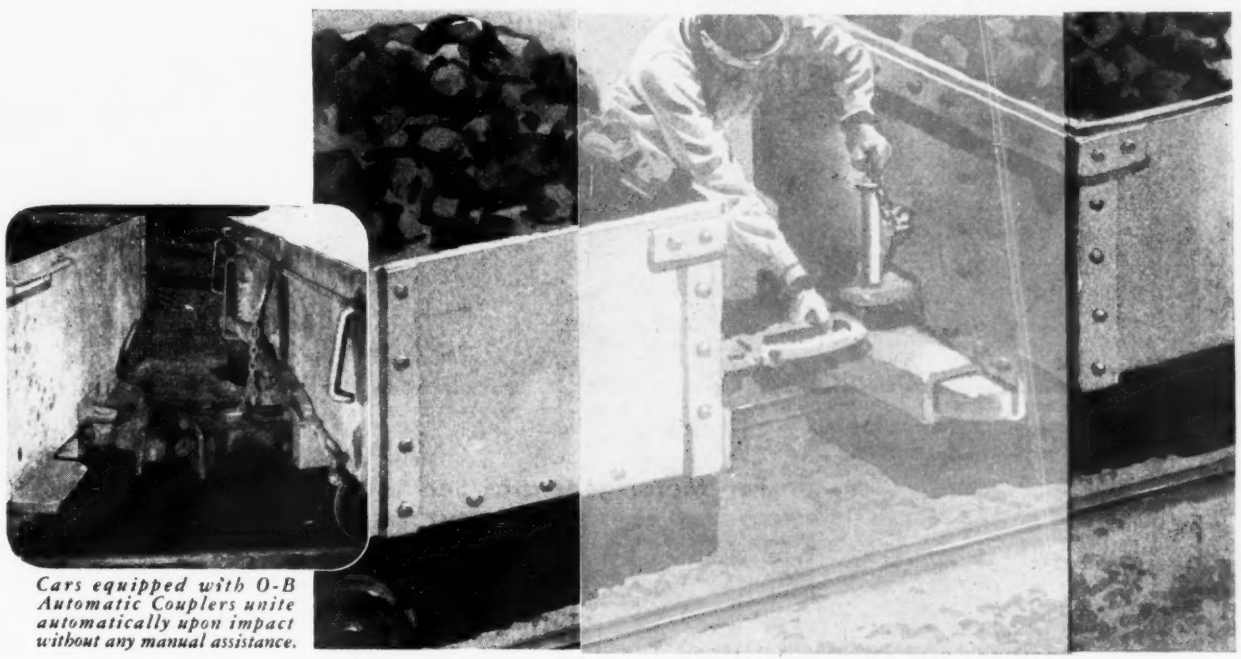
(CHROMATED ZINC CHLORIDE)

WOOD PRESERVATIVE

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

KEEP YOUR WORKMEN AWAY FROM THE DANGER ZONE



Cars equipped with O-B Automatic Couplers unite automatically upon impact without any manual assistance.

O-B Automatic Couplers Eliminate Need For Workmen To Go Between Cars During Coupling Operations.

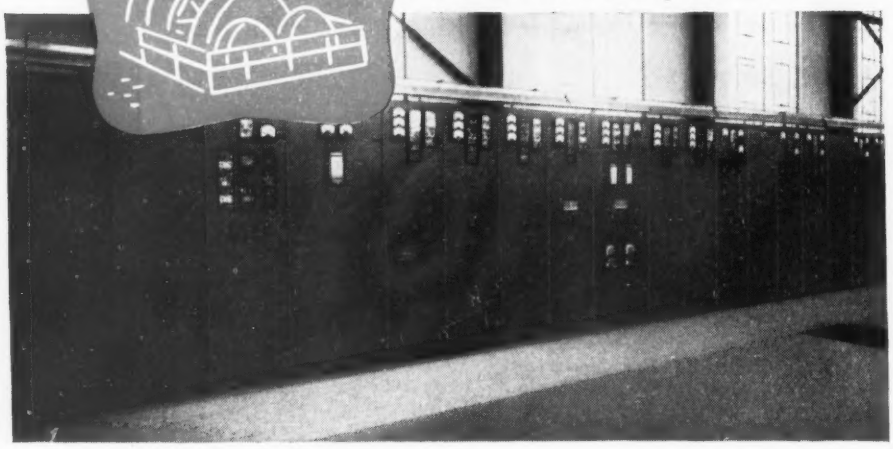
Crushed hands and knees, frequent with outmoded coupling methods, take a heavy toll of production man-hours. Figures tabulated during the past years show coupling to account for one out of every five haulage accidents. Keep your workmen away from the *danger zone* by installing O-B Automatic Couplers. No longer will it be necessary for them to go between the cars to manipulate treacherous link and pin hitchings. Cars couple automatically upon impact. Uncoupling is just as safely accomplished by a convenient lever located on the outside corner of the car.

If you are planning the purchase of new mine cars, either for a new opening or to augment your present production, investigate the safety provisions of O-B Automatic Couplers. We'll be glad to show you how O-B Automatic Couplers can be adapted to both your proposed design and your present car. Write today!

2503-AM

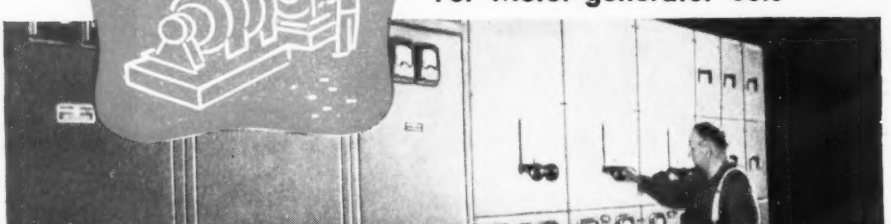
PROTECTED POWER fo

For Hoists—Compressors



● This modern G-E factory-assembled metal-clad switchgear equipment provides circuit protection and metering for hoists and compressor drives at a newly equipped iron-mining project. Included are units for full-voltage starting of induction motors, for reactor starting of others, and for protection of feeder circuits.

For Motor-generator Sets



● Operating the metal-enclosed control equipment for three 250-kw motor-generator sets supplying excitation for a battery of ore separators. In the foreground are three enclosed motor starters which also serve the ore-preparation operation.

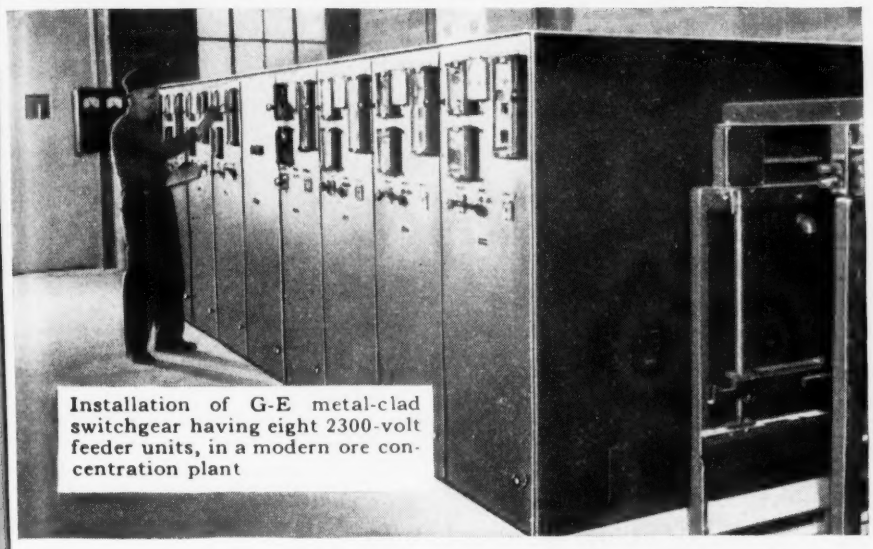
For Co-ordinated Motor Control

● This G-E Cabinetrol assembly is typical of centralized low-voltage control applied to coal-tipple operation. Standard enclosures are used in combinations matched to the job. All operations are controlled from a desk-type push-button station.

EVERY WEEK 192,000 G-E EMPLOYEES PURCHASE MORE THAN A MILLION DOLLARS WORTH OF WAR BONDS.

for Mining and Preparation

USE G-E METAL-CLAD *Switchgear*



Installation of G-E metal-clad switchgear having eight 2300-volt feeder units, in a modern ore concentration plant

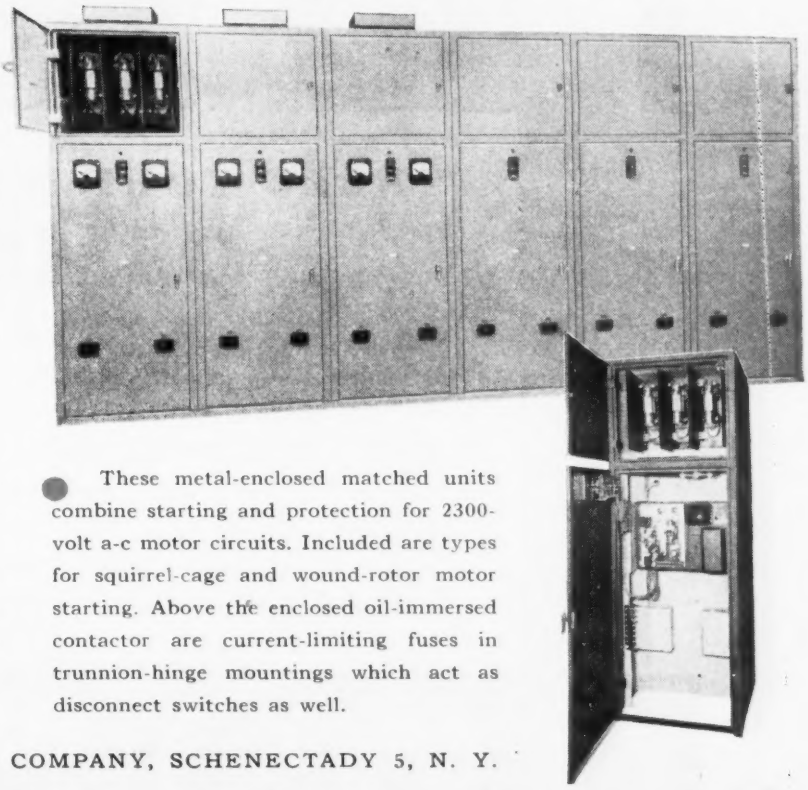
Now, you can protect the continuity of power flow to your operations with switchgear that's completely co-ordinated, completely metal-enclosed. G-E metal-clad switchgear reaches you in fully assembled units. You skid it into place, it's ready to connect. Installed costs are generally lower than for "home-tailored" jobs.

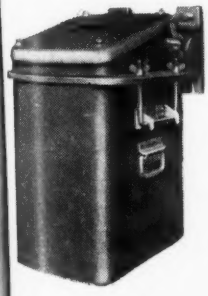
Many special features are built into G-E metal-clad switchgear which save maintenance time and help eliminate hazard to personnel: easily removable breakers which can't be removed when energized; sturdy mechanical interlocks; accessible drawout relays and meters.

Our metal-clad switchgear meets any conceivable switching need up to 15,000 volts, 500,000 kva, and similar equipment is available for higher-capacity installations.

. . . AND METAL-ENCLOSED *Motor Control*

Whatever your motor-starting problem, a-c or d-c, 1 hp or 1000 hp, G.E. can furnish factory-assembled control equipment in a metal enclosure that, for the service conditions involved, means extra safety. Co-ordinated control equipment, grouped in cubicles or matched to form a unit control board, helps centralize operations of preparation or refining plants. Other standard controls are available in dust-tight enclosures, and in Type BM enclosures for use underground in gassy mines.





This popular type of oil-immersed a-c starter is designed particularly for use in dusty, corrosive, or hazardous-gas locations. It's available as a combination of magnetic starter plus manual circuit breaker, or starter alone.

These metal-enclosed matched units combine starting and protection for 2300-volt a-c motor circuits. Included are types for squirrel-cage and wound-rotor motor starting. Above the enclosed oil-immersed contactor are current-limiting fuses in trunnion-hinge mountings which act as disconnect switches as well.

GENERAL ELECTRIC COMPANY, SCHENECTADY 5, N. Y.

GENERAL ELECTRIC

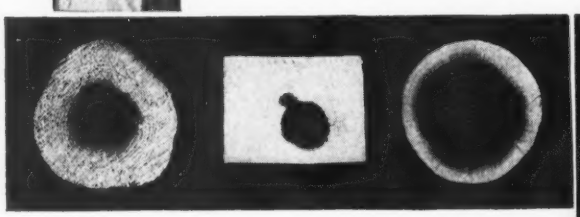
657-29-201

TREAT YOUR OWN TIMBERS WITH

OSMOSALTS

● A good percentage of mine properties are covered with good, usable standing timber...suitable for props, stringers and timber sets...yet often these essential mine supplies are bought elsewhere.

Such "green" timber, when treated with OSMOSALTS, will satisfactorily meet your requirements and reduce your operating costs as well. In addition to these savings, you will obtain dry, clean, odorless treated timbers which are both safe and easy to handle. Investigate. Write today for complete information and technical data.



Illustrated above are cross sections of three kinds of timbers. The white outer areas, which have been subjected to standard color reagent tests, show the deep penetration of the toxic chemicals in Osmosalts.

OSMOSALTS

Nature's Method of Wood Preservation

Composition and Process Patented and Patents Pending

OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.

GENERAL OFFICES: BUFFALO 12, N. Y.

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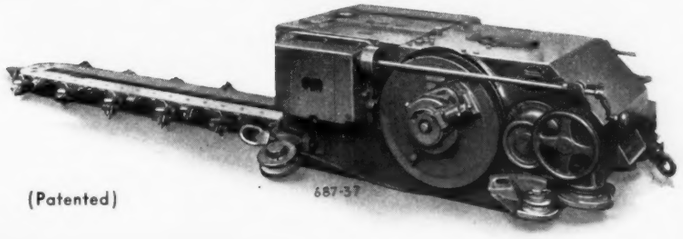
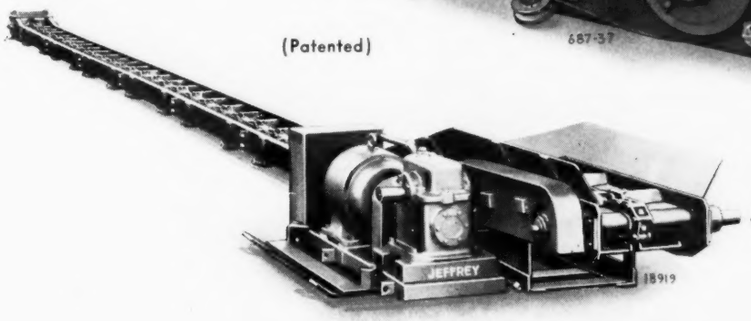
JEFFREY MECHANICAL MININ

FOR LOW COAL

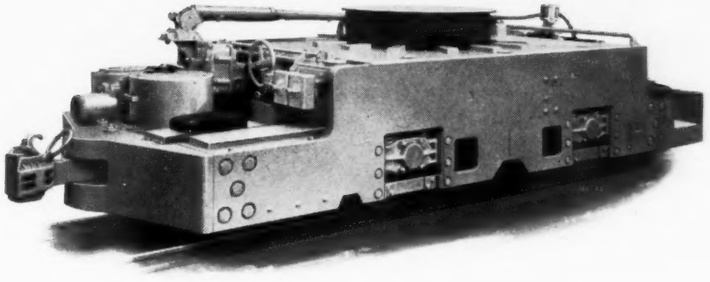
A unit from the Jeffrey mighty "35" series Short-wall coal cutters. Eight types including five for conveyor mining.



(Patented)



Jeffrey Type 61-HG Face Conveyor

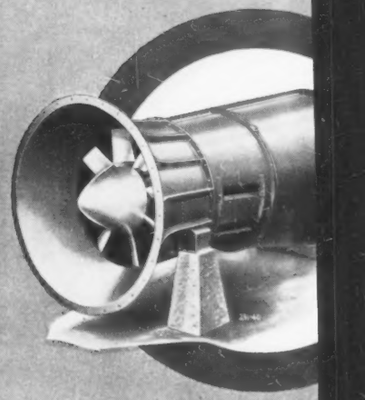


Jeffrey 8-ton Explosion Tested Gathering Locomotive.

(Patented)

Jeffrey A-7 Hand Held Drill (left)—Drilling service at your fingertips. Also Post Drills and Drilling Machines. Jeffrey Aerodyne Midget Blower (right)—High capacity—ideal for low seams.

• The Jeffrey service policy has always been to help you keep your mine plants as modern, efficient and as profitable as progress will permit . . by making your operating problems our equipment problems . . and constantly improving equipment by pyramiding experiences. Our progress through the years, since 1877, has proved this to be a matter of good business, both for you and for us. Some of this modern Jeffrey mining equipment is shown on these pages.



• Jeffrey equipment s
the tipple, complete in
vidual units . . to stora
mines . . to coal and
the power plant . . to
of loading and unload
wholesale or retail yar
Feeding, conveying, s
sizing and ventilating
efficient equipment to
complete your product
coal is out of the gro
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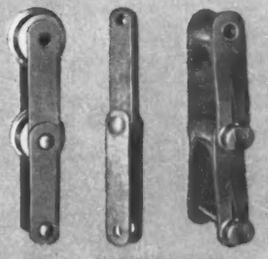
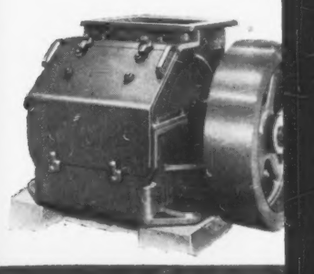
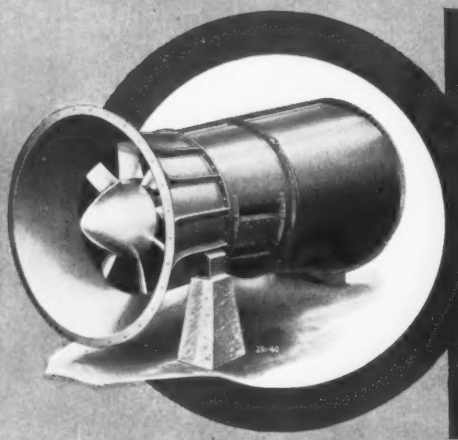


Jeffrey Flex-Roll Crusher
A small inexpensive unit for auxiliary use and for small capacities. Ideal for taking oversize coal from screens, providing accurate control of top size. Investigate this new unit.

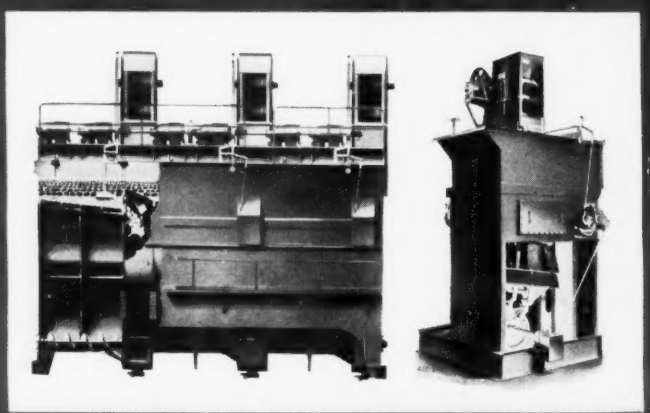


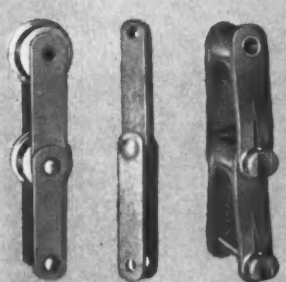
MINING EQUIPMENT



• Jeffrey equipment service extends to the tipple, complete installations or individual units . . to storage systems at the mines . . to coal and ashes handling in the power plant . . to conveyor methods of loading and unloading at docks or in wholesale or retail yards.

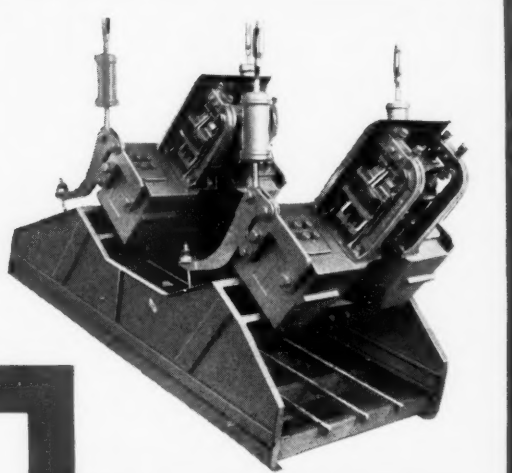
Feeding, conveying, screening, washing, sizing and ventilating . . Jeffrey builds efficient equipment to do them all . . to complete your production job after the coal is out of the ground. Also a complete line of replacement parts.

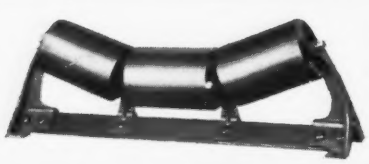




A complete line of chains for every conveying, elevating and driving need. Three types are shown at the left. A Jeffrey Aerodyne Mine Fan, a modern Jeffrey-equipped tipple, two types of Jigs, a Jeffrey-Traylor electric vibrating Conveyanscreen and a J-T feeder, and a Jeffrey 3-roll self-aligning belt idler . . . are shown at the right and below.

(Patented)





Jeffrey Flex-Roll Crusher
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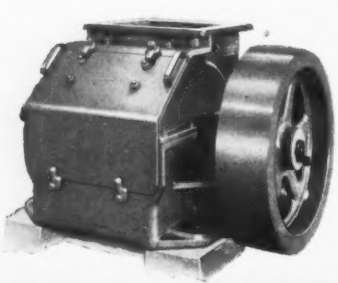

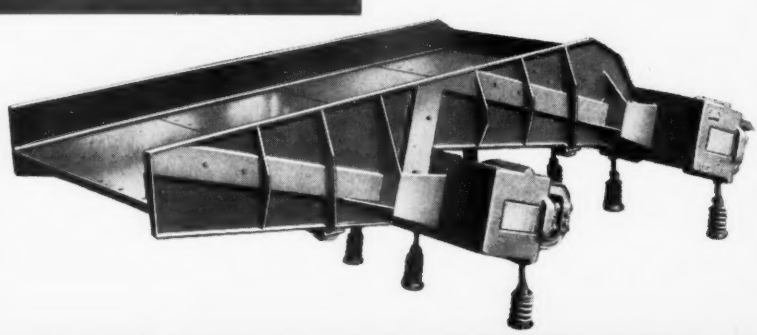

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BELOW AND ABOVE GROUND
FROM FACE TO RAILROAD CAR

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THE JEFFREY MANUFACTURING COMPANY
Established in 1877
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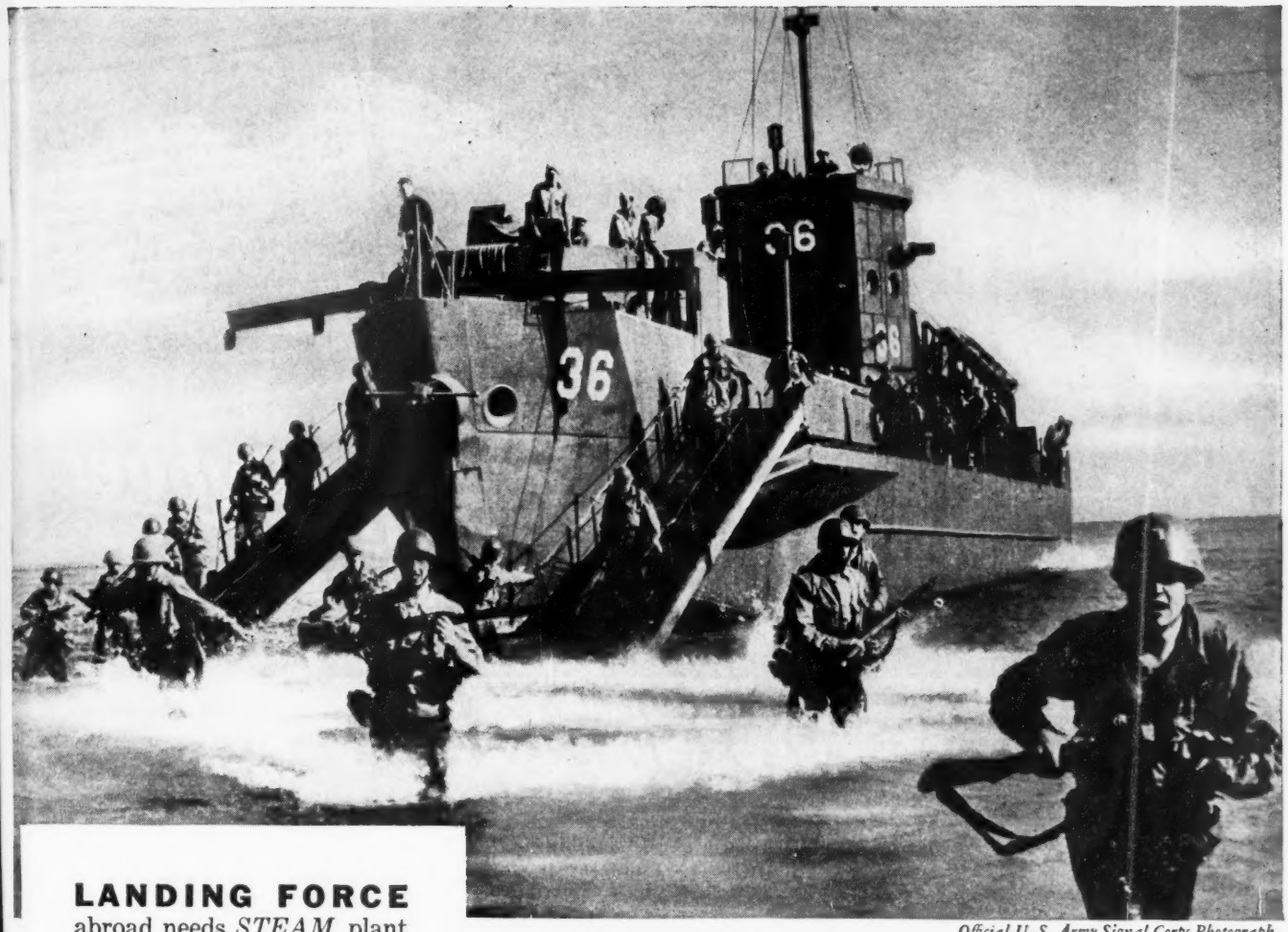
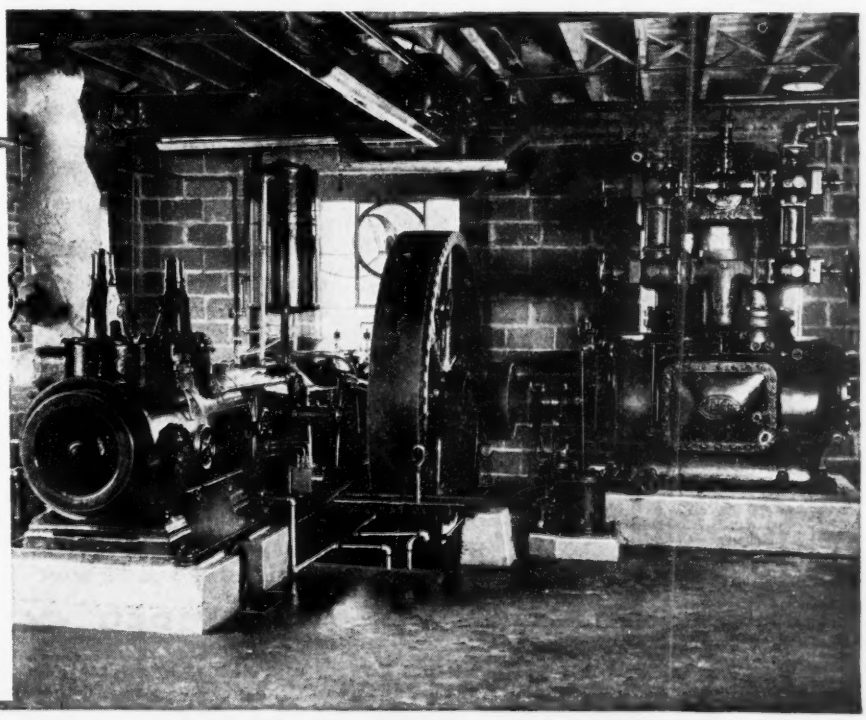
Foreign Plants: Jeffrey Mfg. Co., Ltd., Montreal, Quebec; British Jeffrey-Diamond, Ltd., Wakefield, England; Jeffrey-Galion (Pty.), Ltd., Johannesburg, S. A.



Official U. S. Army Signal Corps Photograph

LANDING FORCE abroad needs *STEAM* plant support at home. For full engine output in continuous service use . . .

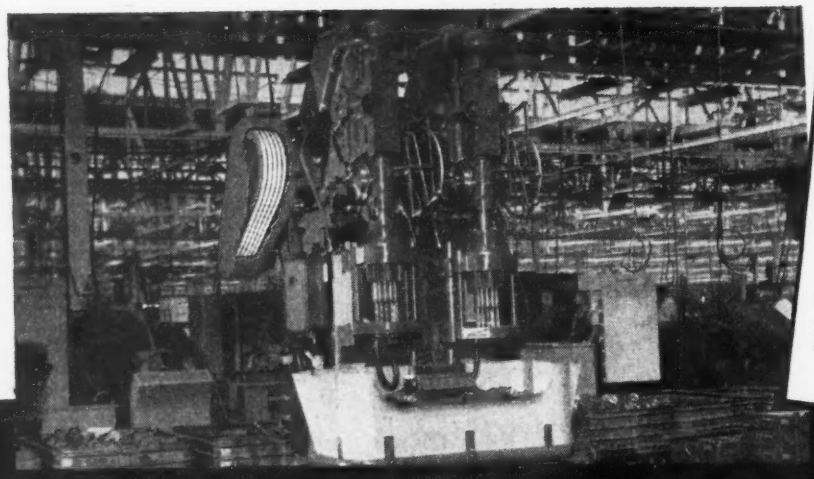


. . . SINCLAIR STEAM CYLINDER and VALVE OILS. These oils give *correct* lubrication under any combination of steam plant conditions . . . suit all engine designs and operating characteristics . . . save on lubricating and maintenance costs.

(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK 20, N. Y.



Here, in one of the nation's leading Aircraft factories, belts on some machines were subjected to a severe oil condition. The Gates Field Engineer recommended Gates V-Belts of special synthetic rubber. Carefully kept records show that these belts are regularly wearing 3 times to 4 times as long as ANY belts of natural rubber ever used.

In This Leading Aircraft Factory . . . .

GATES Synthetic Rubber V-Belts

Your Gates Field Engineer — listed in your telephone directory—will tell you which type of Gates V-Belt best meets your special needs.

Wear *3 TIMES* as *LONG* As Any *NATURAL RUBBER* V-Belts Ever Used!

For more than *6 years,* Gates Field Engineers have been recommending and installing Gates V-Belts of special synthetic rubber wherever a severe oil or heat condition exists.

These belts have now told their service story in aircraft factories, in steel mills, in ordnance plants, in machine parts factories and many other kinds of plants all over the United States. *Everywhere,* they have completely whipped the problem of severe oil conditions. They are wearing two and three and even *four times* as long as any belts of *natural rubber* ever used.

Isn't this a convincing illustration of what you stand to gain by calling the Gates Field Engineer whenever you have the slightest trouble with any drive problem?

You may not have an oil or heat problem — yet *other* service conditions may be such that a V-belt of some special construction can most profitably be used. For example, in your particular installation, Static-Safety V-belts may best fit your special need. Again, Rayon Cord V-belts or V-belts with tension members composed of flexible steel cables may prove to be the most efficient and economical.

In any case, the wisest move you can make is to phone the Gates Field Engineer. He is thoroughly competent to analyze any drive problem. He is completely informed on the nature and advantage of every type of belt. He will always recommend the practice that will be most efficient and economical for you.

GATES V-BELTS INCLUDE:—

1. *Special* Synthetic V-Belts
2. Static-Safety V-Belts
3. Cotton Cord V-Belts
4. Rayon Cord V-Belts
5. Steel Cable V-Belts

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

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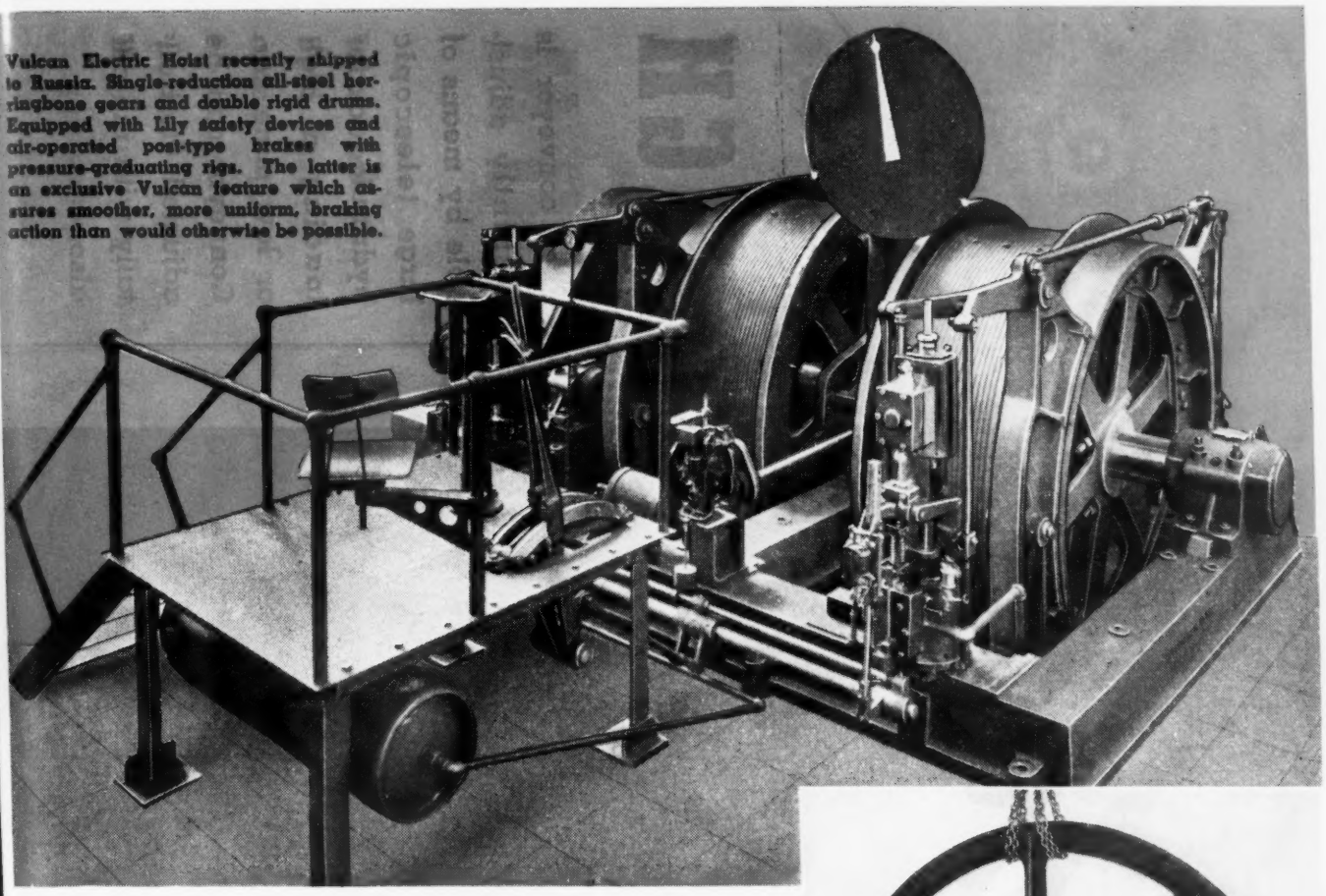
DETROIT, MICH. 8663 Grand River Avenue
PORTLAND, ORE. 333 N. W. 5th Avenue
DALLAS, TEXAS 2213 Griffin Street
SAN FRANCISCO, CAL. 1090 Bryant Street

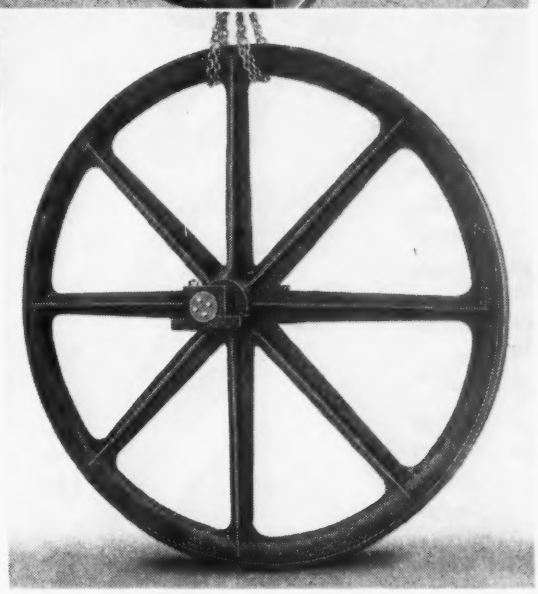


Vulcan Electric Hoist recently shipped to Russia. Single-reduction all-steel herringbone gears and double rigid drums. Equipped with Lily safety devices and air-operated post-type brakes with pressure-graduating rigs. The latter is an exclusive Vulcan feature which assures smoother, more uniform, braking action than would otherwise be possible.

For Service Overseas

In allied countries, as at home, Vulcan equipment is helping, importantly, to maintain production of coal and many other essential materials. The hoist illustrated above, for example, will soon be giving safe dependable service at a Russian colliery—where its simple rugged design, with automatic protection against over-winding, over-speeding and power-failure, will permit efficient operation by the sturdy women who are filling men's places until the war is won.

Write us regarding any heavy-duty hoisting requirement. Hundreds of successful installations, throughout the United States and many other countries, often enable Vulcan engineers to make helpful suggestions—without charge or obligation.



VULCAN "ALLCASTEEL" SHEAVES

were specified and furnished for this, and other, Russian installations. The sheave shown above (for Russia) is ten feet pitch diameter; grooved for 1-3 8" rope and equipped with anti-friction bearings. Light, strong, and highly resistant to rope wear, Vulcan "Allcasteel" Sheaves have proved their superiority for every type of heavy-duty service. Available in any size—for horizontal or vertical mounting—with either plain or anti-friction bearings.

VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Heavy-Duty Electric Hoists	Shaking-Chute Conveyors	Steam Locomotives	Load-Carrying Larries
Self-Contained Hoists	Chain Conveyors	Diesel Locomotives	Rotary Kilns, Coolers and Dryers
Scraper Hoists	Cast-Steel Sheaves and Gears	geared and electric drive	Crushing Rolls and Pulverizers
Car-Spotting Hoists	Cages, Skips and Gunboats	Gasoline Locomotives	Briquetting Machines
Room Hoists	Coal-Preparation Equipment	geared and electric drive	Ball, Rod and Tube Mills

REAR CONVEYOR *Flexibility* FOR EASY, FAST LOWER COST LOADING

• This lowest track loader on wheels is built rugged and strong. It has an unusual wide range of applications. The Clarkson 24BB has the flexibility that counts for fast coal digging and loading. Operator handles all controls from one central point. Has

LOWEST LOADING MACHINE ON WHEELS

Highest Coal Line only 22" from rail

HIGH

Rear conveyor is instantly adjustable by means of large telescopic hydraulic jack for loading a high or low mine car. Conveyor can be adjusted horizontally with the car also.

The rear conveyor

handles all controls from one central point. Has

LOWEST LOADING MACHINE ON WHEELS

Highest Coal Line only 23" from rail

CLARKSON Universal LOADER 24 BB TRACK MOUNTED

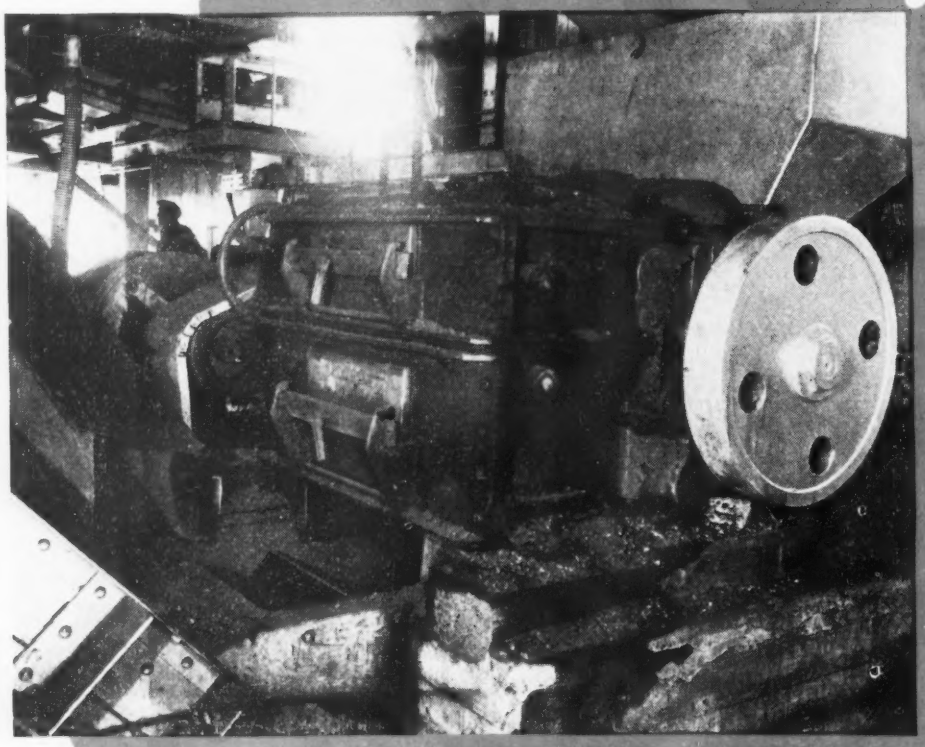
The front head on the Clarkson 24BB can be raised or lowered at the will of the operator. The reason is the two 6" hydraulic jacks mounted on each side of the head and directly ahead of the ring on the front bumper. Operator easily follows the floor of the mine, simply adjusting digging head as the work proceeds. Tight corner shots are dug out perfectly. Built for 38-inch coal and over. The alloy digging arms are riveted to chain blocks—no bushings or swinging arms to wear.

The rear conveyor is so designed that the tail end rests on the ground when not in operation. This keeps the tail out of the trolley wires even in very low coal.

LOW

THE *Clarkson*
MANUFACTURING COMPANY
Nashville, Illinois

FOR A REAL AID TO MAXIMUM COAL PRODUCTION



GET PROVED HIGH TONNAGE PER HOUR CRUSHING

Reversible Manganese STEEL SHREDDER RINGS SPLIT THE COAL

The splitting action of the SHREDDER RINGS shatters and distributes the coal before it reaches the Breaker and Grinding Plates.

These patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher. They have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at the specified speeds. In contact with solid metal the rings are momentarily deflected from their usual course because they are free to swing back out of position. There are no shear pins or other safety devices that require attention.

Examples of Performance

One operator stepped up production with a 60-S Crusher from normal 300 tons per hour to between 350 and 400 tons per hour, producing a 4"x0 product.

An AC Type is used for reducing 150 T. P. H. nut coal to a product passing a 1" round opening screen.

A 30-S Crusher is in service of a large operator reducing 100 tons per hour, 18" lump coal to 1½" and under product.

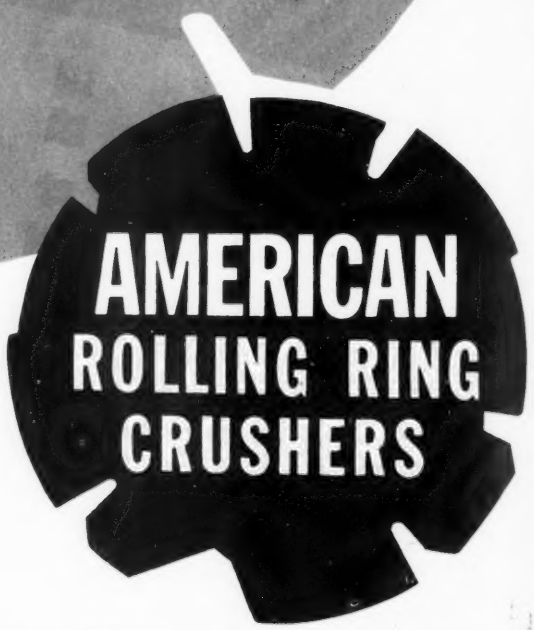
We have one record of an American Crusher having crushed 2,573,836 tons in 13 years without one cent maintenance costs.

MAINTENANCE

It has been proved over years in such services as above that American Rolling Ring Crushers operate at less than one cent a ton, including all costs, to reduce bituminous coal from lump to stoker size. This would indicate that maintenance costs are exceptionally low.

Some of the BENEFITS

You get greater range of reduction—you get uniformity of sizes—you have accessibility at all times—you have a crushing unit of extreme flexibility—you have high tonnage results with high safety factor—you have a unit that is simple in construction, yet durable and that is easy to operate.



Built in many sizes. Each unit is arranged to meet the particular requirements of each application.

AMERICAN PULVERIZER COMPANY 1119 MACKLIND AVENUE ST. LOUIS 10, MISSOURI

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

An S-A engineered conveying and elevating system contributes to efficient coal handling at this large mine.

Behind This Efficient Coal Handling System . . .

Specialized S-A *Engineering*

● The most efficient conveying system operating at the lowest possible cost for any specific job—that's the goal toward which Stephens-Adamson engineers have been working for over forty-two years.

Examples of their success are to be found throughout the coal mining industry, where efficient material handling is essential to profitable operation.

If your plans call for improvements or expansions, call on S-A where the *right equipment* is engineered into the *right system* for *your* requirements.

STEPHENS-ADAMSON MFG. CO.

RIDGEWAY AVENUE, AURORA, ILLINOIS — LOS ANGELES, CALIF. ★ BELLEVILLE, ONT.

Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT

12802

GOODMAN MANUFACTURING COMPANY

The GOODMAN LOADER

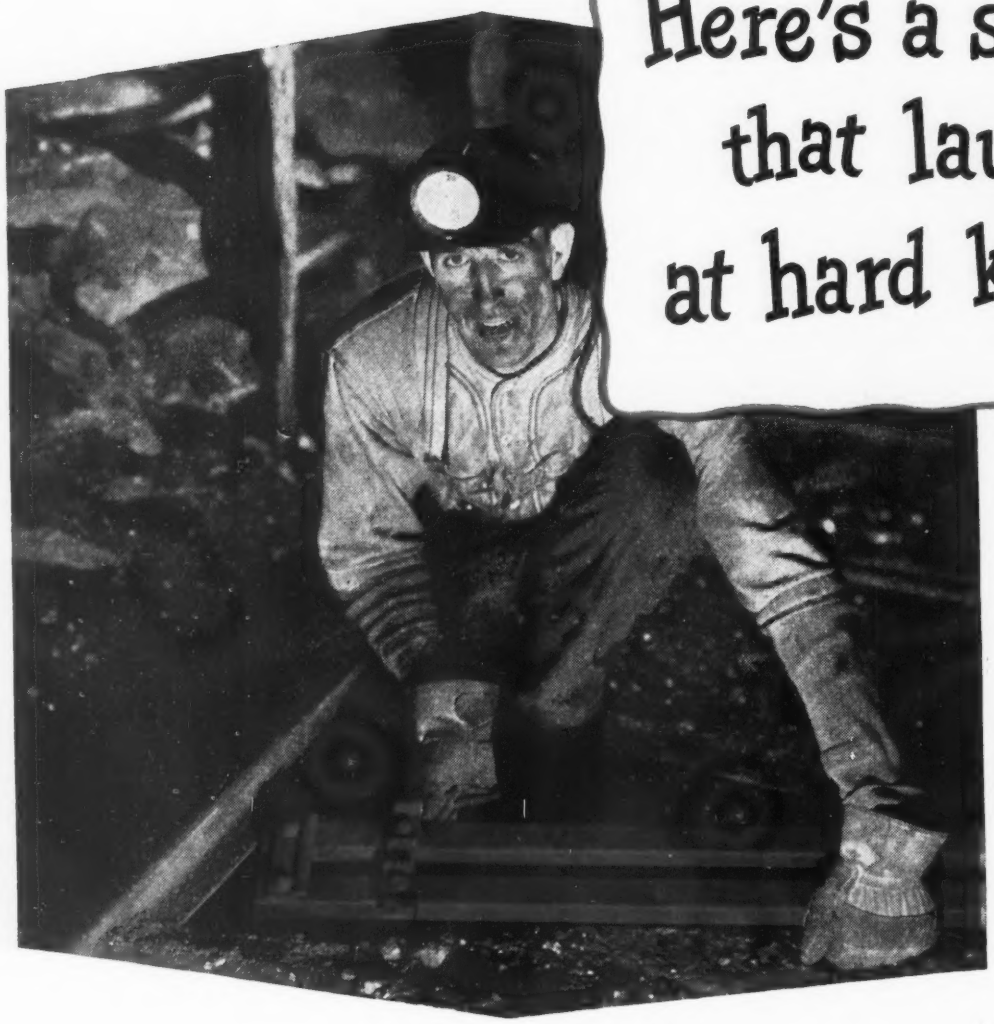
Type 460

The Goodman Track Type Loader can be depended upon for fast, high capacity, economical loading.

ARMY E NAVY

HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

Here's a steel tie that laughs at hard knocks



. . . but that's only ONE of its many advantages

When Bethlehem's No. 5 Steel Ties go into your mine, they're going in for a long stay. The No. 5 Tie is built to last.

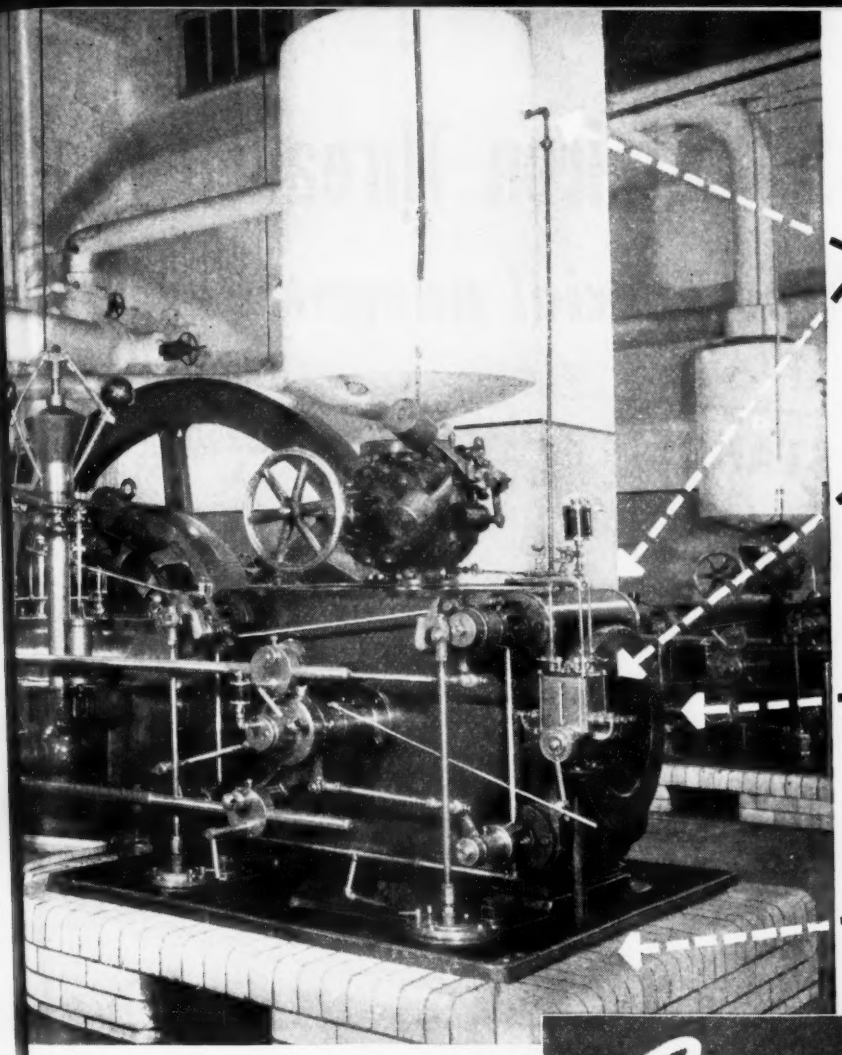
Weighing five pounds per foot of section, it is definitely intended for 40-pound rail. Even under the crushing weight of track-mounted cutters and loaders, the No. 5 Tie won't buckle or be pounded out of shape. Though it naturally costs a bit more than ties of lighter section, its extra-long life and overall economies make it cheaper in the long run.

But durability isn't the only feature that justifies the installation of these rugged steel ties. Automatic gaging, made possible by large, sturdy clips, saves hours and hours of track-laying time. A hammer blow easily knocks each clip into place on the rail flange; a similar blow unlocks it when changes of layout are called for.

Another thing: as no spikes are needed, the track-laying time is reduced still further. Working with No. 5 Ties, a crew can get the track in place almost as fast as it is brought up and set down.

Mine crews like these easy-to-handle ties—and superintendents and mine-owners like their economies. Write for details—or, if you prefer, a Bethlehem engineer will be glad to call and tell you more about the No. 5 Tie.

★ ★ ★ BETHLEHEM STEEL ★ ★ ★



1. LESS DEPOSITS

2. LOWER OIL CONSUMPTION

3. BETTER LUBRICATION

4. CLEANER EXHAUST STEAM

5. ALL-PURPOSE CYLINDER OIL

5 operating advantages with *New* STANOCYL Steam Cylinder Oil

1. Less deposit formation. New Stanocyl protects engines against the formation of deposits. It contains a combination detergent and oxidation inhibitor in addition to special steam cylinder oil compounding. This inhibitor reduces oxidation of the oil at high temperatures—one frequent cause of deposit formation. The detergent additive helps keep deposits—either oxidized oil or foreign matter—from settling out at points of low steam velocity. Thus, the potential deposit-formers are carried through the engine and are easily removed from the exhaust steam.

2. Lower oil consumption. New Stanocyl atomizes readily even in the heaviest grades. This means that a heavier grade than would normally be used can be applied to take advantage of lower oil feeds, and still give adequate lubrication.

3. Better lubrication. New Stanocyl has unusual wetting ability. It adheres to cylinder walls and replaces any water present. It also resists the washing action of water such as is encountered in unusually wet steam. These factors, plus better atomization, contribute to more effective lubrication.

4. Cleaner exhaust steam. New Stanocyl separates readily from exhaust steam. Where steam is used for processing or heating, proper separators adequately serviced will keep the steam free from oil carry-over.

5. An all-purpose cylinder oil. New Stanocyl is made in three grades. Two grades, W and SH, are available for special operating conditions. Stanocyl D is an all-purpose steam cylinder oil. This one oil will handle the cylinder lubrication requirements of a plant having a variety of engines. It will lubricate both high and low pressure cylinders of compound engines. Stanocyls have given excellent satisfaction at steam pressures ranging from 100 pounds saturated steam to 250 pounds with 100° F. superheat.

A Standard Lubrication Engineer will be glad to work with you in applying Stanocyl D to reduce troublesome operating problems. Call the nearest Standard Oil Company (Indiana) office, or write 910 S. Michigan Ave., Chicago 5, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

Oil is Ammunition . . . Use it Wisely

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

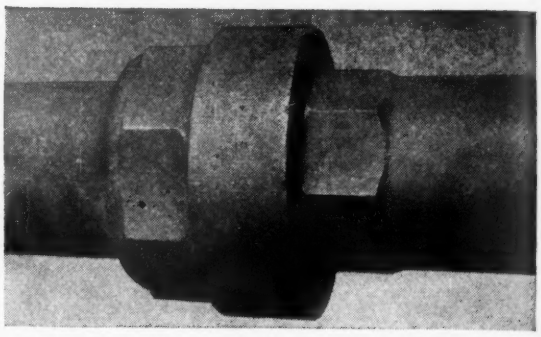
LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBR

Walworth Hi-Test Cast Iron Threaded Pipe

gives these three special advantages

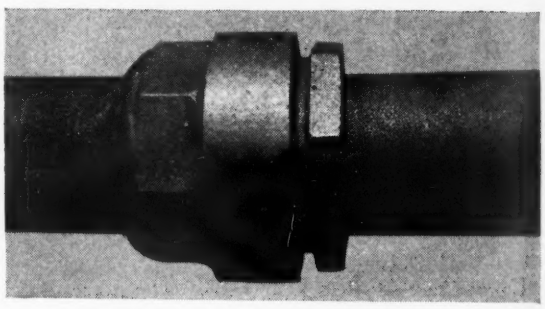
1 CORROSION RESISTANCE where it's needed most

Extra wall thickness at the threads in Walworth Hi-Test Oversize Threaded joint provides greater strength and resistance to corrosion.



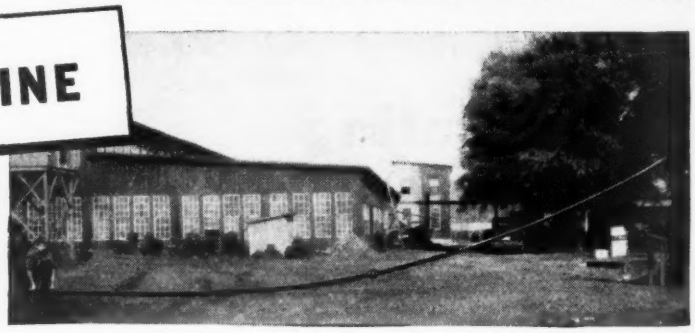
2 TIGHT EXPANSION JOINTS

Hi-Test flexible expansion joints, available with Walworth Hi-Test Cast Iron Pipe, provide a tight connection and allow for 1½" expansion or contraction. There are no exposed threads or bolts.



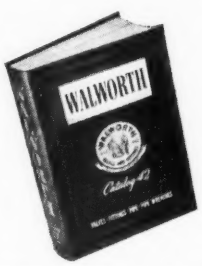
3 FLEXIBILITY IN THE LINE

Notice the unusual flexibility achieved with a Hi-Test expansion joint and two standard 20′ lengths of 1¼" Walworth Hi-Test pipe.



Walworth I.P.S. Hi-Test Cast Iron Threaded Pipe with regular pipe size threads is primarily for use in drainage, vent and waste lines in buildings and for pipe lines above or below ground. It complies with Federal Specification No. WW-P-356, dated August 19, 1936, and is recommended in all sizes for 175 lbs. Non-Shock Cold Water Pressure.

Walworth I.P.S. and W.P.S. Hi-Test Pipe with oversize threads are principally for use in underground water and gas distribution systems. For complete details write for Bulletin 57.



You'll find pertinent information on Walworth's complete line of valves, fittings, pipe, and pipe wrenches in the new Walworth Catalog 42. Included are 78 pages of practical engineering data that simplify valve selection and make piping layouts easier. Write, on business stationery, for your free copy. Address: Walworth Company, 60 E. 42nd St., New York 17, N. Y. Dept. D12.

ARMY ARMY NAVY

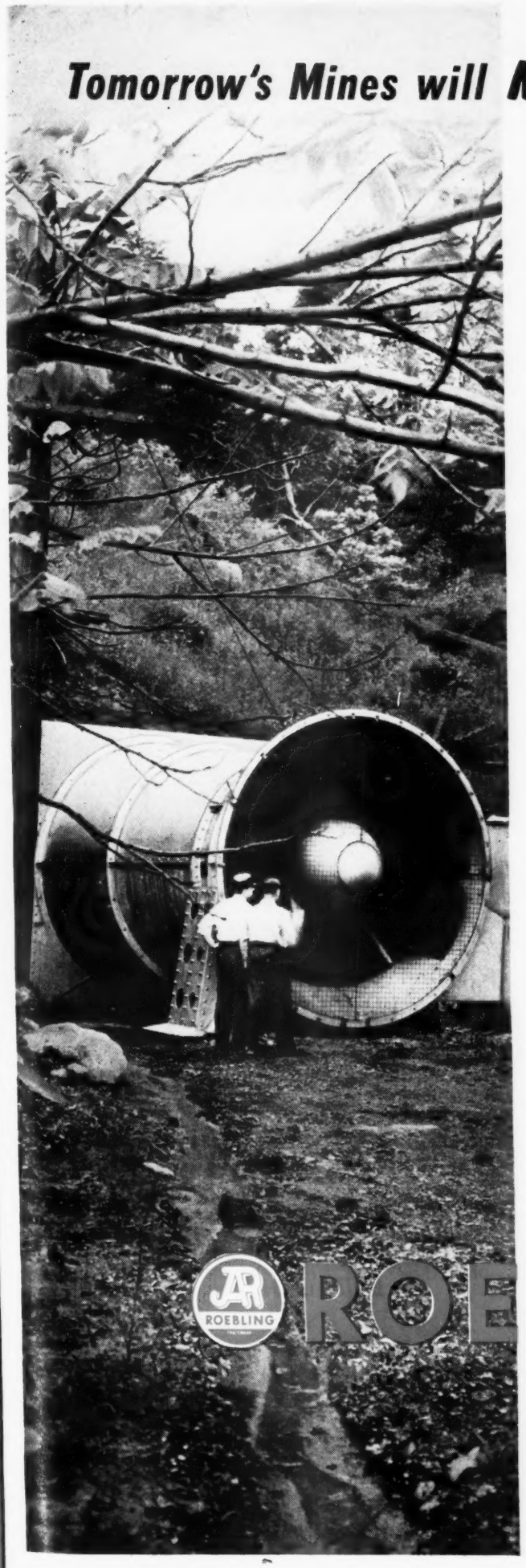
BOSTON WORKS
KEWANEE WORKS

WALWORTH
valves AND fittings

WALWORTH ★ VALVES AND FITTINGS ★ ESTABLISHED 1842

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Tomorrow's Mines will MODERNIZE Electrically



BETTER VENTILATION MEANS MORE COAL PER MAN-HOUR

IN MODERNIZED MINES after the war, axial-flow fans will offer many advantages over the old-style centrifugal type. They are more compact. They use far less power. Their higher efficiency will clear the workings quickly after blasts. Throughout the mine, the air will be clearer, cleaner. Men will work better, with greater satisfaction—produce more coal.

Better ventilation is typical of the electrical modernization that will come naturally to forward-looking mines after the war ends and materials become readily available. It's important to plan now for such modernization.

RIGHT IN YOUR TERRITORY is a power engineer, made available to you by your electric company. He has facts on improvements, new equipment, better methods. He can make suggestions that will help you toward better ventilation, improved pumping, maintenance of line voltages, better preparation. Get together with him soon. He may provide suggestions for immediate improvement, such as relocating fans for increased efficiency.

And when Victory makes materials available again, remember Roebling are *wire specialists*, ready to provide the right conductor for every job.

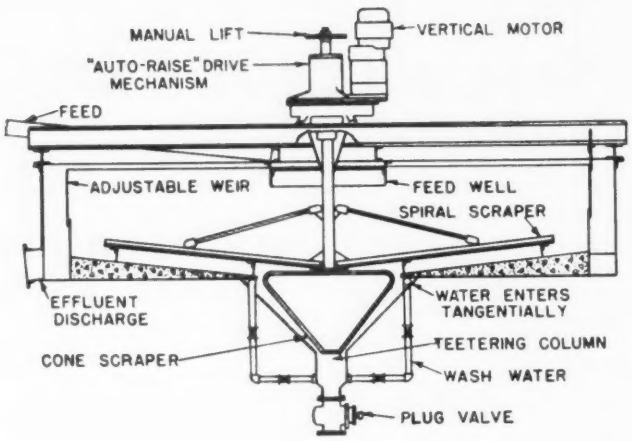
JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

Mine entry cables
Mining machine cables
For Every Job ....The Right ROEBLING Electrical Wire and Cable
Locomotive reel cables
Bore hole cables
Trolley wires

ROEBLING

PACEMAKER IN WIRE PRODUCTS

Wire Rope and Strand • Fittings • Cold Rolled Strip • High and Low Carbon Acid and Basic Open Hearth Steels • Aircord, Swaged Terminals and Assemblies • Round and Shaped Wire • Wire Cloth and Netting • Electrical Wires and Cables • Suspension Bridges and Cables Aerial Wire Rope Systems



FOR RECOVERY OF FINE COAL

A 30 foot diam. HARDINGE Hydro-Classifier was installed to recover minus 3/16 inch plus 48 mesh coal from wash water

HARDINGE EQUIPMENT

	Bulletin No.
Agitators	31-C
Clarifiers	31-C
Classifiers, Air	17-B
Classifiers, Counter-Current	39-A
Classifiers, Hydro	31-C
Density Stabilizer	42
Digesters	36
Dryers	16-C
"Electric Ear"	42
Feeders, Belt	33-C
Feeders, Constant Weight	33-C
Feeders, Disc	33-C
Feeders, Drum	33-C
Feeders, Non-Flooding	33-C
"Feedometer"	43
Filters, Sand	30-A
Metal, Reclamation	8-A
Mills, Batch	19-A
Mills, Conical Ball	13-D
Mills, Conical Pebble	13-D
Mills, Rod	25-B
Mills, Tube	18-A
Mixers, Slurry	31-C
Pumps, Diaphragm	32
"Ruggles-Coles" Dryers	16-C
Kilns and Coolers	16-C
Scrubbers, Conical	37
"Thermomill"	17-B
Thickeners	31-C

•

3500 G.P.M. feed to the Hydro contained 6.2% solids with 61% plus 48 mesh coal.

43 tons per hours of coal at 72.4% plus 48 mesh containing 7.5% ash was produced.

The overflow of 9 tons per hour, 2.6% plus 48 mesh and 12.5% ash was sent to waste.

For complete clarification of mine or breaker water, the Hardinge Thickener does a thorough job.

Bulletin 31-C

•

HARDINGE

COMPANY, INCORPORATED - YORK, PENNSYLVANIA

New York, 122 East 42nd Street Chicago, 205 West Wacker Drive San Francisco, 501 Howard Street Toronto, 200 Bay Street

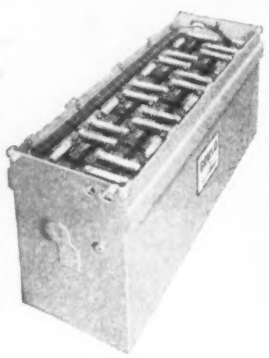
Get This Chart

IT TELLS HOW TO OBTAIN LONGER CABLE LIFE

This helpful two-color poster, 22" x 28", tells how to order, store, install and maintain electrical mining cables so they will give longer and more efficient service. To obtain a free copy just write the Hazard Insulated Wire Works, Division of The Okonite Co., Wilkes-Barre, Pa.

HAZARD

Electrical Wires and Cables for Every Mining Use



Rated Conservatively... Goulds equal or exceed in capacity any battery of comparable size and cell structure.

★

Are you receiving the monthly, informative "Gould Battery News"? If not, write for it.

● Sustained voltage at unusually high discharge rates, even under continuous load, is an outstanding characteristic of the Gould Kathanode battery.

Gould's spun glass mats, while holding the active material in place, are highly porous. This allows a large volume of the electrolyte to remain in contact with the active material and is thus a factor in maintaining terminal voltage.

Equally important is Gould Black Oxide, the active material with a pure lead core. Throughout the life of the battery this black oxide maintains a full volume of positive active material within the plate. This means that the quantity of active material exposed to the electrolyte is constant, assuring high capacity and sustained voltage.

Goulds deliver that extra power so essential in meeting unexpected emergencies. It will pay you to get all the facts. Write today for the Gould Kathanode Bulletin, using business letterhead.

GOULD STORAGE BATTERY CORP.

DEPEW, N. Y. • Factories at Atlanta, Ga. • Chicago, Ill. • Dallas, Texas Depew, N. Y. • Leavenworth, Kan. • Los Angeles, Cal. • North Bergen, N. J. • Sioux City, Iowa • St. Paul, Minn. • Zanesville, O.

ARMY NAVY

FOR EXCELLENCE IN STORAGE BATTERY PRODUCTION AT DEPEW PLANT

GOULD

Since 1898 THE BATTERY PICKED BY ENGINEERS

HOW TO USE A HYDROMETER

One of a series of service suggestions for users of industrial batteries

▶ The hydrometer is a measuring instrument which provides a convenient means of gauging the amount of charge remaining in a battery. According to the U. S. Bureau of Standards it should be made of clear glass, with a smooth, circular cross section for the full length of the barrel carrying the float. The scale must be clearly marked and accurate to one-half of the smallest division shown.

Like any other precision instrument your hydrometer should receive periodic attention. The barrel and float must be kept clean, so the float will not stick to the sides. Ordinary soap and water is excellent for this purpose, if the barrel and float are thoroughly rinsed before reassembling. At this time it is also good practice to inspect the float for cracks which might allow acid to enter its air tight compartment and thus make any reading unreliable.

Actually a syringe type hydrometer gives an accurate indication of how much unused sulphuric acid remains in the battery's solution. This, in turn, is a convenient measure of the capacity remaining in a normal cell for, as it is charged, more and more acid is "driven from the plates into the electrolyte" giving it a greater specific gravity. Conversely, when being discharged the acid "leaves the electrolyte and enters the plates."

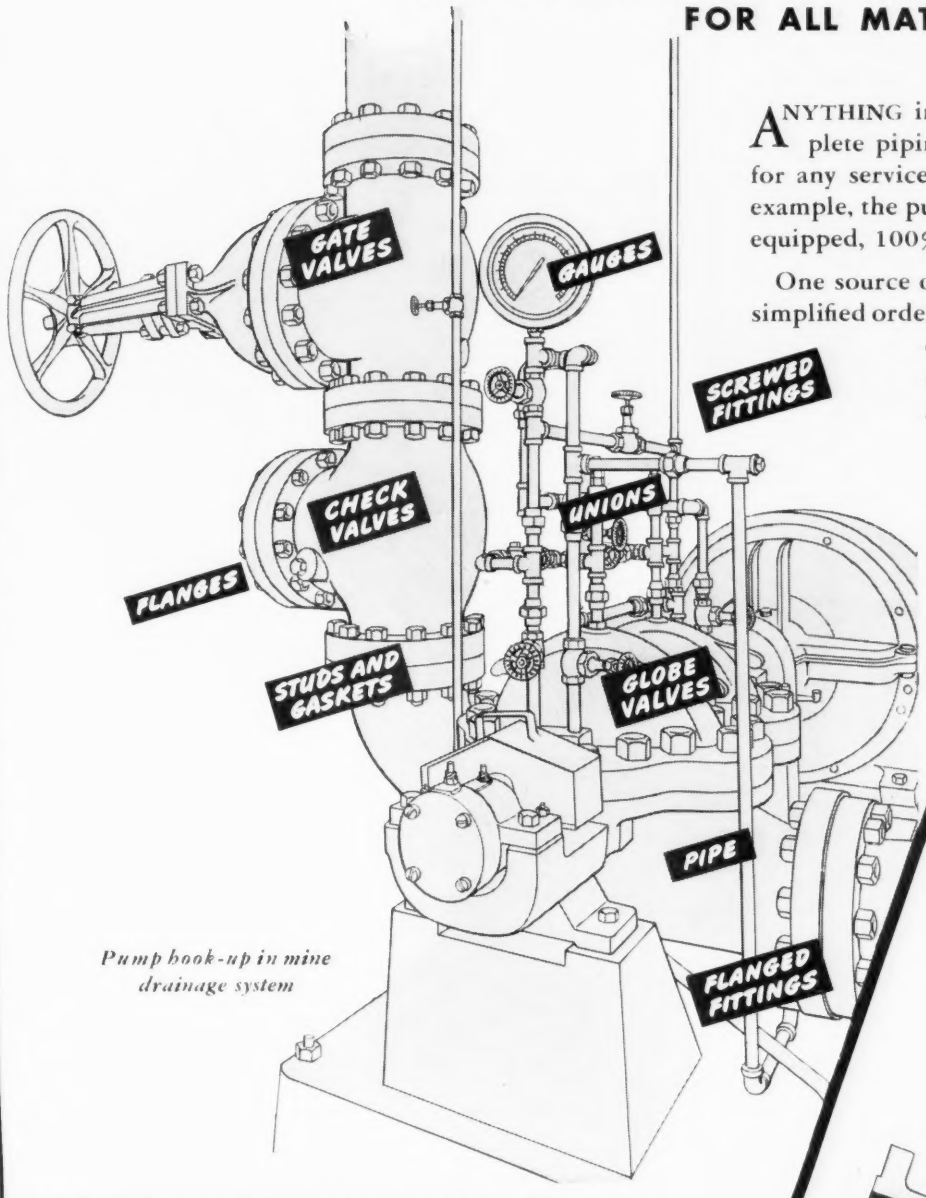
To assure accuracy in hydrometer readings, the liquid level of each cell should be normal when the reading is taken. If you have added water make sure that the electrolyte is thoroughly mixed. It is better to take hydrometer readings after charge. The gassing incidental to this charging mixes the water and acid in each cell and thus makes hydrometer readings more reliable.

In reading a hydrometer, it must be held vertical and sufficient electrolyte drawn up into the barrel to lift the float. The float must ride freely so that it touches neither the sides, top or bottom of the barrel.

The hydrometer reading is taken on the float scale at a point level with the liquid's surface. To do this hold the hydrometer at eye level and disregard the curvature of the liquid where the surface rises against the float stem and the barrel.

When it's piping you need —CRANE can supply it

ONE SOURCE OF SUPPLY... ONE RESPONSIBILITY FOR ALL MATERIALS



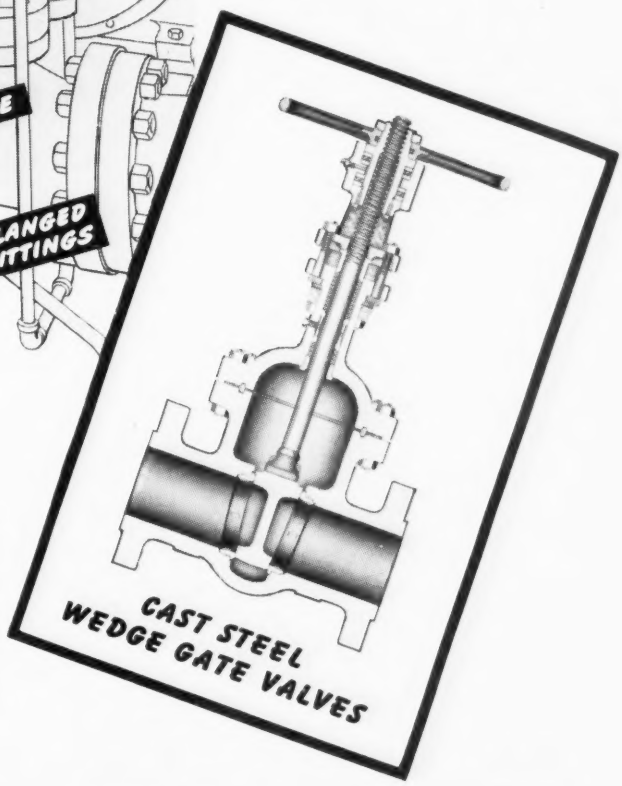
Pump hook-up in mine drainage system

ANYTHING in piping—a single fitting or complete piping system—in brass, iron, or steel for any service—you can get it from Crane! For example, the pump hook-up illustrated; it's Crane-equipped, 100%.

One source of supply for all your piping means simplified ordering and maintenance work—easier control of parts stocks. One responsibility for all materials insures best results from each installation.

These advantages are yours when you specify Crane. The world's greatest selection of materials, and Crane Co.'s 89-year leadership in piping see to that.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill.



ONE STANDARD OF QUALITY

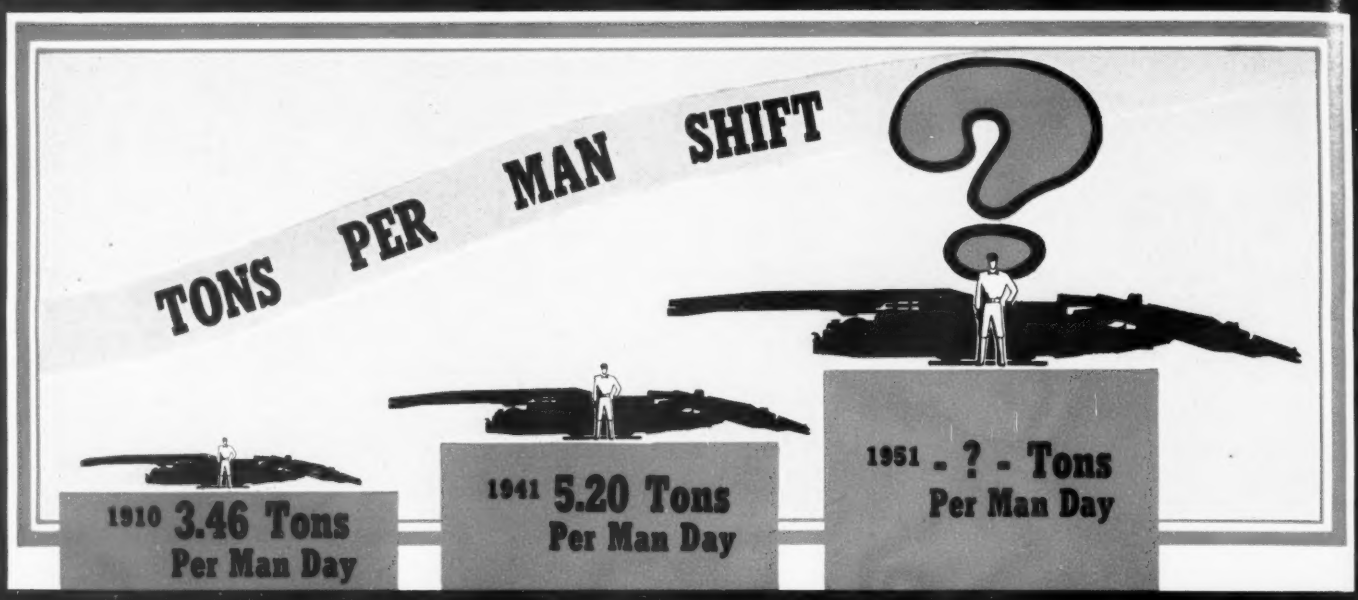
The dependable quality—adequate for the need—of each single item in this installation, is exemplified by Crane Steel Gate Valves. Straight-through ports minimize turbulence, erosion, and resistance to flow. A stronger tee-head disc-stem connection, ball-bearing yoke, and non-corrosive stem bearings, assure smoothest operation. Extra long disc guides make seating positive.

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

DO YOU WANT TONNAGE

. . . . . OR QUALITY . . .



★ Whether an operator is "tonnage" minded or "quality" minded, ALLEN & GARCIA engineering service can be of great value.

The possibilities for lowered production costs are numerous—in some cases almost infinite.

Consider these "TONNAGE" FACTORS

When COAL AGE says that PRESENT machines can frequently produce 25% MORE tonnage with better handling, maybe *your* machines can do it.

When COAL AGE says that bigger mine cars can save 10c and MORE per ton, does that apply to *your* mine?

When COAL AGE says that face preparation costs can be cut 20—30%, does the statement apply under *your* working conditions?

Consider these "QUALITY" FACTORS

COAL AGE says that only one-third of the industry has MODERN Preparation Equipment. If your mine *isn't* in this group, how will you stack up in the post-war competition for markets?

If that mine five miles down the line—mining the same seam—has a modern cleaning plant and you haven't . . . catch on? You don't have to go back so many years to recall who was moving coal every day and who was working a couple of days a week.

Quality will be the characteristic which will keep the better Sales Agents clamoring for your coal.

Quality will sell coal at the right price to those industrial plants which will have installed efficient coal burning facilities.

A Σ G CO

or Both?

HOW CAN THE ALLEN & GARCIA COMPANY HELP YOU GET THIS TONNAGE AT A LOWER COST AND THIS QUALITY AT A PROFIT?

First, let us say that our prime stock-in-trade is the "KNOW-HOW." Years of practical experience have enabled our organization to observe most methods under many sets of working conditions. Thus we offer the "KNOW-HOW" of "TESTED METHODS."

We DESIGN, DETAIL, PURCHASE, and ERECT with a minimum of wasted effort and a maximum of benefit to the client. We work with an undivided responsibility to you, at a fixed fee. We are not hampered by any connections which might prejudice the true professional engineering approach to the problem.

The scope of our operations include . . .

Organization, operation, and management of mines

Design and construction of new plants and their various units

Below ground modernization and mechanization

Reconstruction, revamping, or improvements of existing plants

General consulting work regarding power, equipment, operation, and various mining problems

Valuations for financing, fire loss, for taxation purposes—reports and appraisals

We invite consultation
on your TONNAGE-QUALITY problems.

ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO, ILL. • 120 WALL ST., NEW YORK, N. Y.

"COME ONE-COME BOTH!"

Tough and ready "110" can handle these birds. He's got just what it takes to lick both abrasion and shock at once. When he puts on a hard-surface, it's there to stay — and parts stay on the job longer.

This special P&H Alloy Electrode is used for general repair and maintenance when abrasion and shock resistant welds are needed. "110" has a hardness range of from 20 to 40 Rockwell "C" without heat treatment. With flame hardening, its values run as high as 62 Rockwell "C".

Whatever your wartime problems demand, there is a P&H Alloy Electrode ready to serve. The complete line includes all types for hard-surfacing, resistance to wear, impact and abrasion, for welding stainless steels, 4-6% chrome steels, air hardening steels, etc.

See your P&H representative for information and procedures, or write us.

P&H *Alloy* **ELECTRODES**

Get the story on P&H A.C. and D.C. arc welders. Learn how their simplicity of operation can give you greater welding production and faster operator-training. All P&H welders are rated on WSR which gives exact welding current from minimum to maximum capacity. Send for literature today. Early deliveries possible.

General Offices and Factory: 4540 West National Ave., Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

WELDING ELECTRODES · MOTORS · HOISTS · P&H · ELECTRIC CRANES · ARC WELDERS · EXCAVATORS

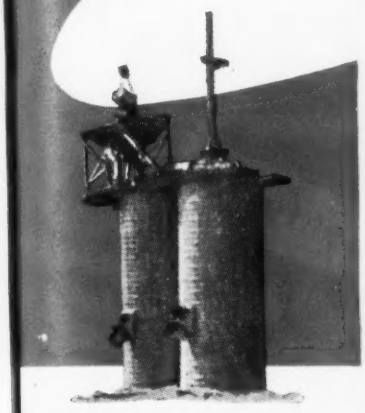
Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.

Morrow

HAS ALWAYS HAD THE "*KNOW-HOW*" FOR BUILDING EQUIPMENT THAT INCREASES PRODUCTION AT LOW OPERATING COSTS!

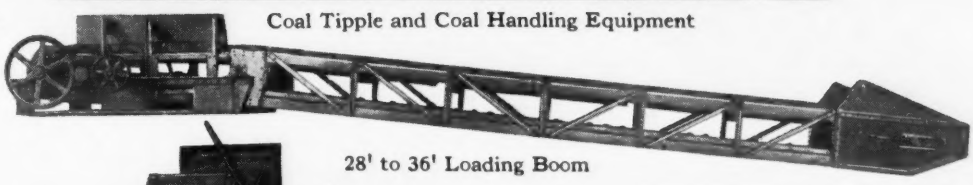
MORROW offers the Coal Mining Industry a complete engineering and planning service for the building of entirely new tipple operations or modernization of present facilities to provide increased production with lower operating costs,—backed by successful installations for progressive operators in every coal mining section throughout the country.

MORROW engineers welcome the opportunity of working with you in developing the most satisfactory solution to your particular production problem.

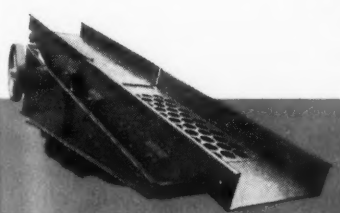


Sand and Gravel Equipment

Coal Tipple and Coal Handling Equipment

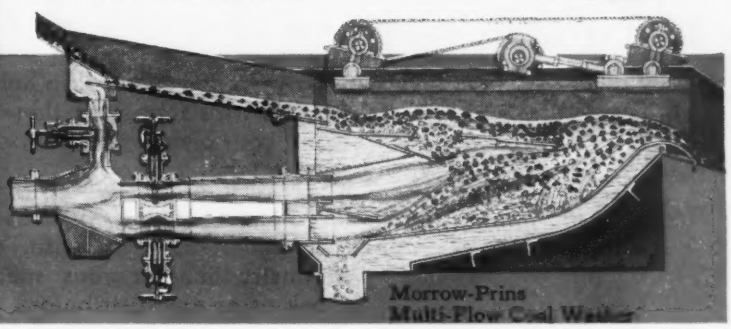


28' to 36' Loading Boom

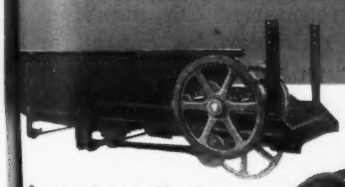


Retail Screening Unit

Bin Gates and Chutes

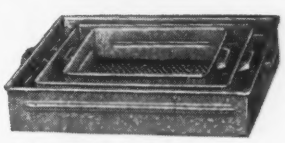


Morrow-Prins Multi-Flow Coal Washer

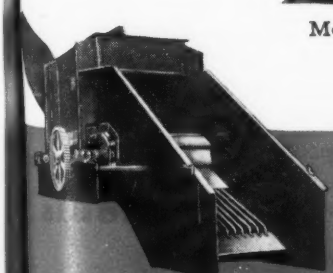


Sturdy Apron Feeders

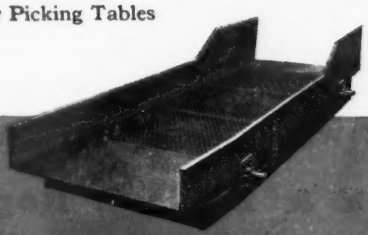
Morrow Picking Tables



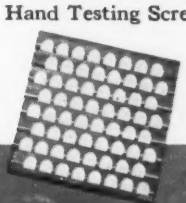
Hand Testing Screens



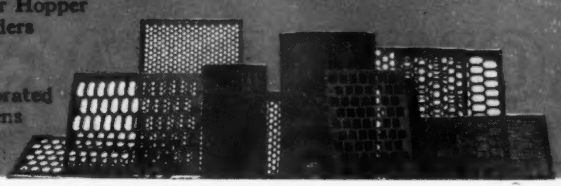
Straight or Hopper Plate Feeders



Shaking Screen Section



Short Flanged Lip Screens



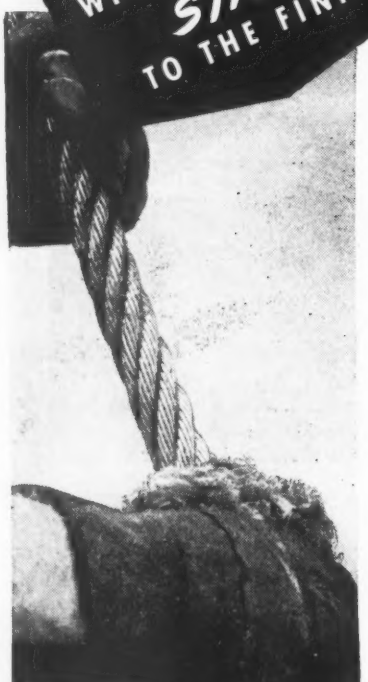
Perforated Screens

MORROW

MANUFACTURING CO., WELLSTON, OHIO

Designers and Builders of Coal Handling Equipment For Over 25 Years

Our troops inspect a captured Axis tank, looking for booby traps.
INTERNATIONAL NEWS PHOTO



Every battle is a showdown . . . our men, weapons and equipment against the enemy's . . . *wire rope* included. That's why our forces need the best rope they can get . . . *and lots of it.* Below are some of the ways in which *you* can help to send more wire rope over there by making your own rope *last longer* over here:

1. Start with the correct wire rope. If uncertain about size, grade or construction for your specific job, ask us or any distributor.

2. Check equipment thoroughly. Repair or replace worn, corrugated or wobbly sheaves. Line up sheaves with each other and with drums, making sure rope does not rub against flanges. Inspect drums for roundness.

3. Install rope carefully. Avoid kinking when unreeling and handling. Never drag rope across concrete or gravel. Wrap rope snugly and evenly on drum, avoiding cross-winding.

4. Break in rope cautiously, gradually increasing speeds and loads. And break in the operator, if inexperienced. Instruct him in the importance of smooth starts and stops . . . reasonable loads . . . frequent examination of rope, sockets, clips and splices.

5. Care for your rope. Clean and lubricate regularly. On many installations rope can be cut off or shifted to distribute wear. Get better acquainted with ropes by sending for our free Hand Book, "Wire Rope for Mining."

One thing more: Use wire rope of known stamina and dependability. *Preformed* Yellow Strand combines flexibility, toughness, elasticity and strength in proper balance. It stays on the job . . . curtails replacements . . . helps you keep manpower and equipment producing . . . for Victory.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

YELLOW STRAND
PREFORMED WIRE ROPE

CARDOX

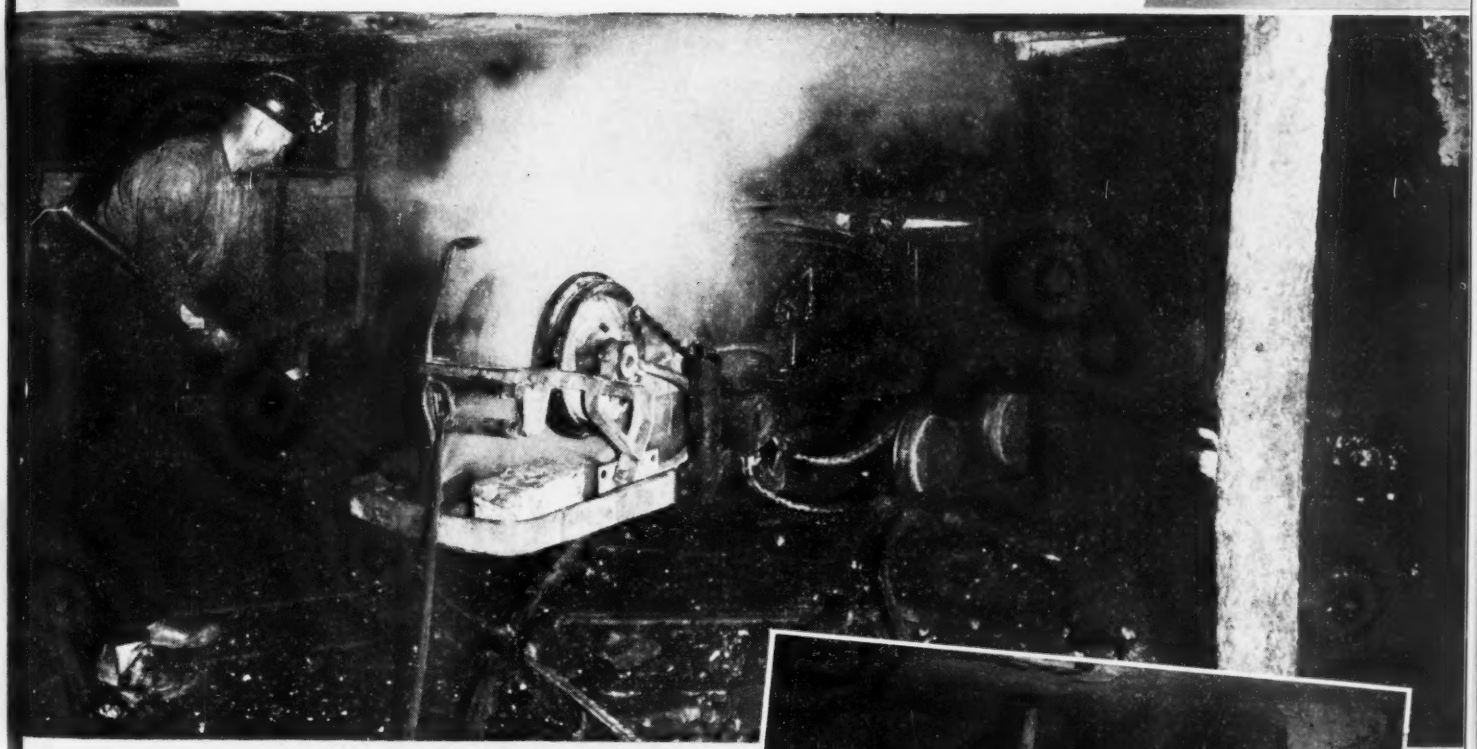
"THE NON-EXPLOSIVE MINING METHOD"

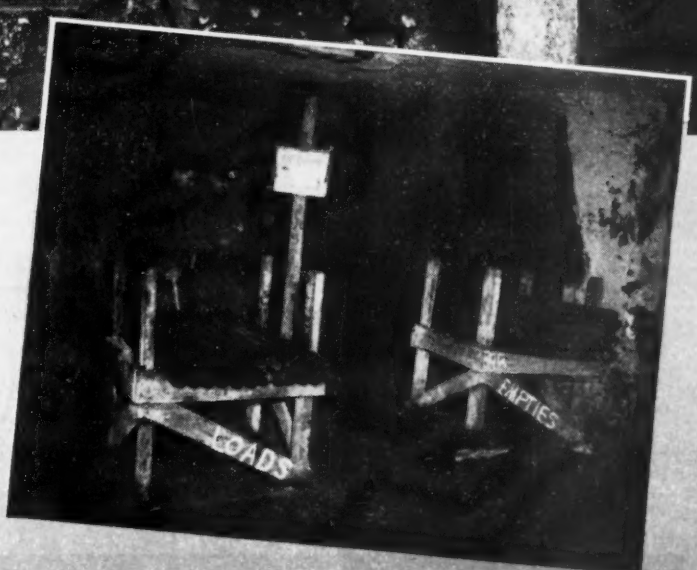
PROVIDES EFFICIENT

Easy-to-Use, Non-Damaging

CO_2 FIRE EXTINGUISHERS

WHEREVER CARDOX TUBES ARE STORED





● In mines that use CARDOX for breaking down coal, there is always at hand a number of efficient, easy-to-use fire extinguishers.

The carbon dioxide used in CARDOX Tubes quickly smothers and cools out fires at their inception. When the CO_2 is released, the CARDOX Tube is pointed at the fire as shown in the illustration, or thrown into fires that cannot be approached.

The CO_2 spreads rapidly and uniformly . . . even against a strong draft. It penetrates where water or rock dust cannot reach. Since this gas is inert it does not wet or otherwise damage machinery. A non-conductor of electricity, CARDOX CO_2 is safe to use on motors and other electrical equipment. Get a free test of CARDOX in your own mine. See for yourself how it helps increase tonnage, reduce costs, protect against roof and rib failures. Any of these CARDOX advantages justifies its adoption. Should fire strike, its availability may mean high savings in time and property.

Write or wire for details of free demonstration.

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

WORLD'S FASTEST ELECTRIC COAL DRILL

Six-foot holes in less than one minute in Pocahontas seam, is a typical performance of the "Whippet," CP No. 571 Hand-Held Electric Coal Drill. The highly efficient, compound-wound D.C. motor and the special safety clutch make possible drilling speed far in excess of those previously available.

Weighing only 40 lbs. in the Open type, and 43 lbs. in the Permissible model, the CP "Whippet" can easily be handled by one man in the softer seams of coal. It is excellent for close quarter work and can drill parallel holes within two inches of top or bottom. For detailed information about the CP Hand-Held "Whippet" — the world's fastest coal drill—write for SP 1995.

CP manufactures the largest line of Hand-Held and Post-Mounted electric coal drills: five sizes of the Hand-Held type, and four sizes of the Post-Mounted type.

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ELECTRIC TOOLS
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ROCK DRILLS

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VACUUM PUMPS
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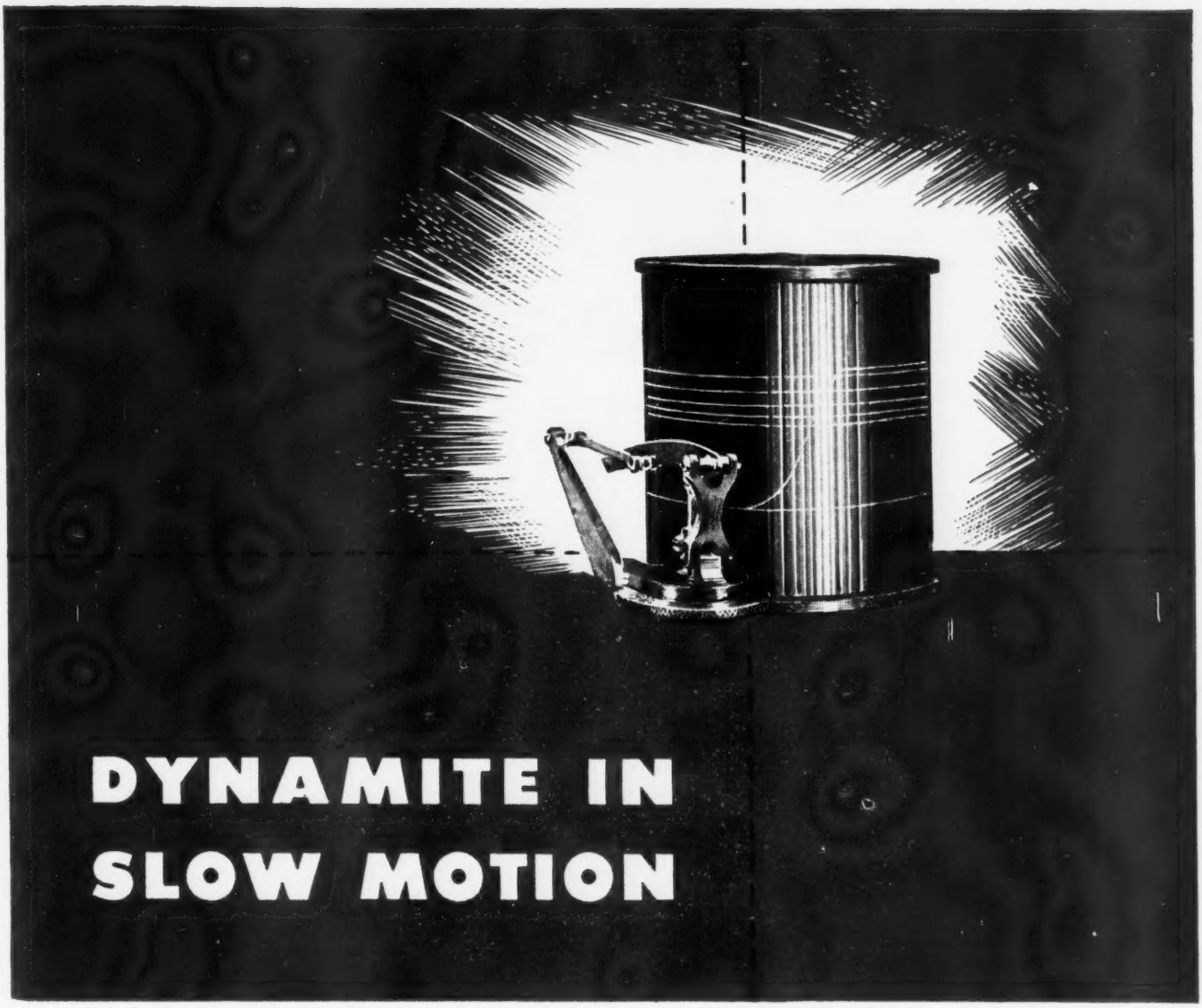
AVIATION ACCESSORIES



DYNAMITE IN SLOW MOTION

TRANSLATING THE DETONATION of an explosive into a continuous line . . . and thus charting the exact rate at which pressure is developed is one of the tasks of the recording device pictured above. In effect, it produces a slow-motion picture of an explosion so that its characteristics may be accurately observed.

Through apparatus such as this in one of the most modern laboratories, Hercules technicians study the behavior of explosives of almost every type . . . and thus add to their background of knowledge. It is this wealth of experience—in research, in the field, and in manufacturing—that maintains a constant vigilance over the quality of Hercules explosives, for your benefit and ours.

HERCULES EXPLOSIVES

HERCULES POWDER COMPANY
INCORPORATED
940 King Street
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BOWDIL COAL CUTTING EQUIPMENT

Watch your costs come down!

★

• To obtain peak coal cutting efficiency . . . to rout excessive coal cutting cost . . . and to speed operations—specify BOWDIL Coal Cutting Equipment.

Illustrated is the BOWDIL Bit and Chain combination. In use in *your operations* it will:

SAVE TIME

(Note that couplings have been designed for quick, easy removal and replacement. This saves man-hours . . . reduces maintenance time)

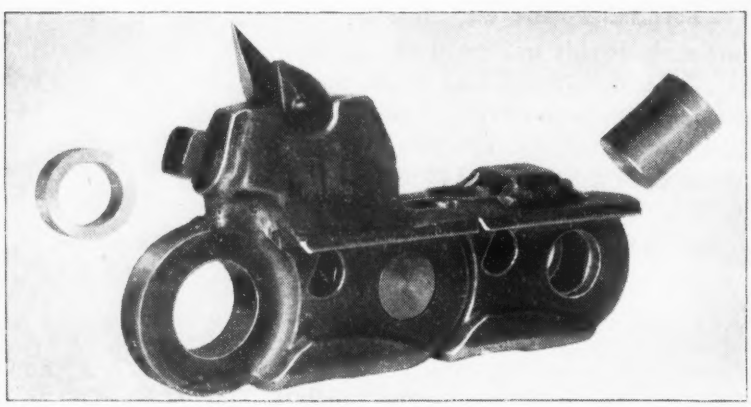
SAVE POWER

(BOWDIL BITS thin construction plus the great strength and rigidity of the Chain reduces power requirements . . . give 25% to 30% more coarse cuttings and 20% longer service life.

CUT THINNER KERF

(BOWDIL BITS are rolled with concave faces thus greatly increasing clearance and permitting them to be worn down 25% farther than standard bits without increasing power demand or dust.)

Let BOWDIL help you save time and money. Write, or call on the BOWDIL Engineer today.



ASK THE BOWDIL SALES ENGINEER TO SHOW YOU COST-CUTTING EXAMPLES

THE BOWDIL COMPANY • CANTON • OHIO

EDISON ELECTRIC CAP LAMPS MSA COMFO CAPS

Keeping pace with coal mining progress since Thomas Edison's introduction of electric cap lamps underground, the Edison Lamp supplies safe, brilliant illumination which is a model of unfailing dependability . . . *light* of highest quality for better man-safety, better production tonnage, better service to the Nation.

Edison Electric Cap Lamps, powered by the famous Edison Alkaline Battery, offer unparalleled long life in service. Paired with the sturdy M.S.A. Comfo Cap for proved head protection, this winning combination aids miner and management in today's great production program!

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS · PITTSBURGH, PA.
District Representatives in Principal Cities

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MINE SAFETY APPLIANCES COMPANY OF CANADA, LIMITED
TORONTO . . . MONTREAL . . . CALGARY . . . NEW GLASGOW, N. S.

For outstanding production achievement . . . the Maritime "M" Pennant with added Gold Star, and Victory Fleet Flag, awarded to M. S. A. by the U. S. Maritime Commission.

Among the Latest Gelatinous Permissible Powders is . . . NAPCOGEL

POWDER NATIONAL COMPANY

Napcogel has extraordinarily high water resistance. It is a good "Rocker" in headings, tunnels, or shafts where gas and/or dust is present.

Napcogel has the following outstanding qualities:

- Class A Fumes.
- A stick count of 208. 1¼" x 8" cartridges per 100 pounds.
- Its speed is 17,000 feet per second.
- Its weight strength is 65%, and its bulk strength is 65%.

◆

Napcogel is but one of ten Permissible Powders manufactured by National. Millions of pounds of National Permissibles are being used annually by some of the representative operators East of the Mississippi River.

Not Living on Our Reputation but Building It!

NATIONAL POWDER COMPANY

ELDRED (McKean County) PENNA.

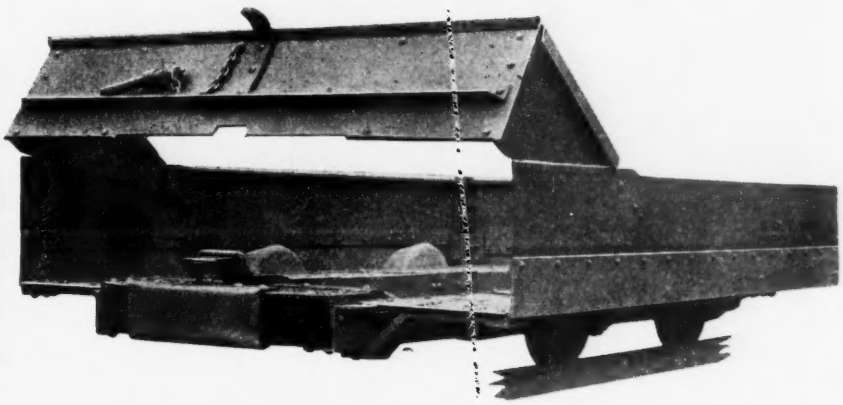
Manufacturers of High Explosives for All Industrial Purposes

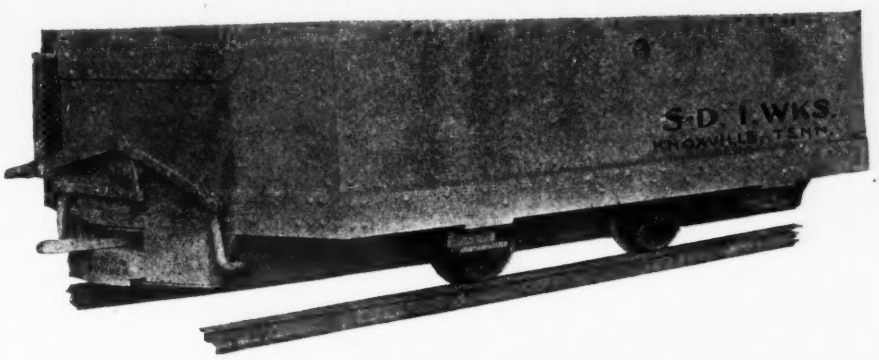
★ Need Replacements In End-Dump Or Rotary-Dump Cars?

Throughout the coal mining industry, for almost 40 years, Sanford-Day has been recognized for their ability to build End-Dump and Rotary-Dump cars that stand up through the years to meet the hard service demanded of these cars. We developed the "low-floor" types of large capacity cars and our "Whopper" End-Dump and Rotary-Dump cars will give you maximum capacity for any given overall dimensions.

S-D "Whopper" End-Dump Car

With our cantilever construction, heavy structural steel side truss members easily support the heaviest load without sagging. They are attached to the rugged cross cantilever members at the body corners and run from one end of the body to the other. This car has Drop Axles and Armor plate bumpers. No other design of End-Dump car approaches its simplicity, strength, ruggedness and long life. No binders on sides to strip off.





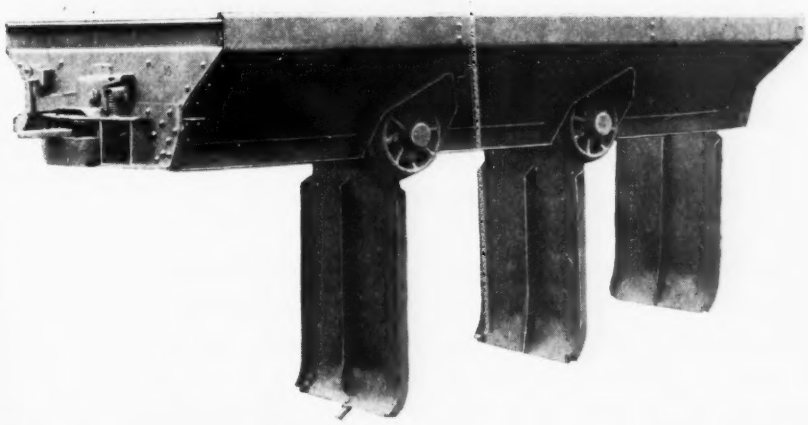
S-D "WHOPPER" ROTARY-DUMP CAR

Cantilever construction. Maximum capacity. No binders to strip off against ribs. No unnecessary weight. Easily repaired. Supporting all the weight on the flares are the massive crosswise cantilever structural members at the ends of the car body, resting on and attached to the rectangular steel truck frame. Simple, strong. Pan Bottom. Drop Axles. Armor Plate Bumpers.

For Increased Production and Drastic Savings Change Over to S-D 1-2-3 "Automatics"

★ You can easily discharge 15 to 20 S-D "Automatic" cars of coal a minute . . . a big saving in time compared with End-Dump or Rotary-Dump cars of equal capacity. In addition, the S-D 1-2-3 "Automatic" doesn't *dump* the coal, it *lays* it down gently through one door opening at a time . . . reducing breakage of coal to the minimum.

The S-D "Automatic" leads an easy life compared with End-Dump and Rotary-Dump cars, and, consequently, it lives much longer. The resultant savings in maintenance is a big item. Changing over to S-D 1-2-3 "Automatics" will pay you well. Investigate them now.



Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

WALTER TRACTOR TRUCKS

Keep Your Tonnage UP...

Why let bad weather and road conditions cause either tonnage slumps or trailer capacity restrictions? Walter Tractor Trucks keep your tonnage up even when deep mud and slippery surfaces have stopped or slowed other trucks. With their unfailing FOUR wheel traction, Walter Tractor Trucks pull the heaviest trailers up steep grades and over soft surfaces without gouging the road or burning the tires.

It's the greater "haulpower" of Walter Tractor Trucks that frees you from tonnage limitations. Famed for 100% traction, the exclusive Walter Four Point Positive Drive delivers more horsepower from motor to road. Wheel slippage is prevented by three patented Automatic Locking Differentials that proportion the power to the FOUR driving wheels according to the traction of each wheel at any instant.

Investigate the many Walter features, such as Suspended Double Reduction Drive, Tractor Type Transmission, Short Wheelbase, Scientifically Distributed Weight. Learn what they mean in increased tonnage, lowered costs and multiplied manpower. Write today.

WALTER MOTOR TRUCK COMPANY
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WALTER TRACTOR TRUCKS

How to prevent a "pinch out" of this critical material...

U. S. ROYAL MINING MACHINE AND LOCOMOTIVE CABLES

Many mines—alert to the possible consequences of electrical cable failure during the rubber shortage period—have set up organized programs of "cable care."

So that your drills will keep on working, your haulage equipment go on rolling and your machinery continue running—protect your electrical cables against early deterioration, undue wear and accidental damage. See that these few simple rules are strictly observed:

1. **Store all cable in a cool, dark place.**
2. **Avoid overheating...use cable of adequate size...keep the number of layers of cable on service reels to a minimum.**
3. **Keep cable free from oil and grease.**
4. **Utilize short pieces of cable by splicing together for desired lengths. For good service and durability see that splices are well made...preferably vulcanized.**
5. **Avoid excessive flexing.**

UNITED STATES RUBBER COMPANY

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....and it's here in the 7-AU

● Any man who has ever had anything to do with any machine knows that the simpler its construction, the better it is going to work, the longer it is going to last. The finest engineering always aims at the simplest construction. All of which is a testimonial to the quality of Sullivan 7-AU Coal Cutters. For, although the 7-AU has the greatest range, flexibility and usefulness, it has the simplest design and construction of any track cutter on the market. This is a matter you can verify for yourself, a matter no shrewd buyer will overlook the next time he is in the market for a coal cutter. . . .
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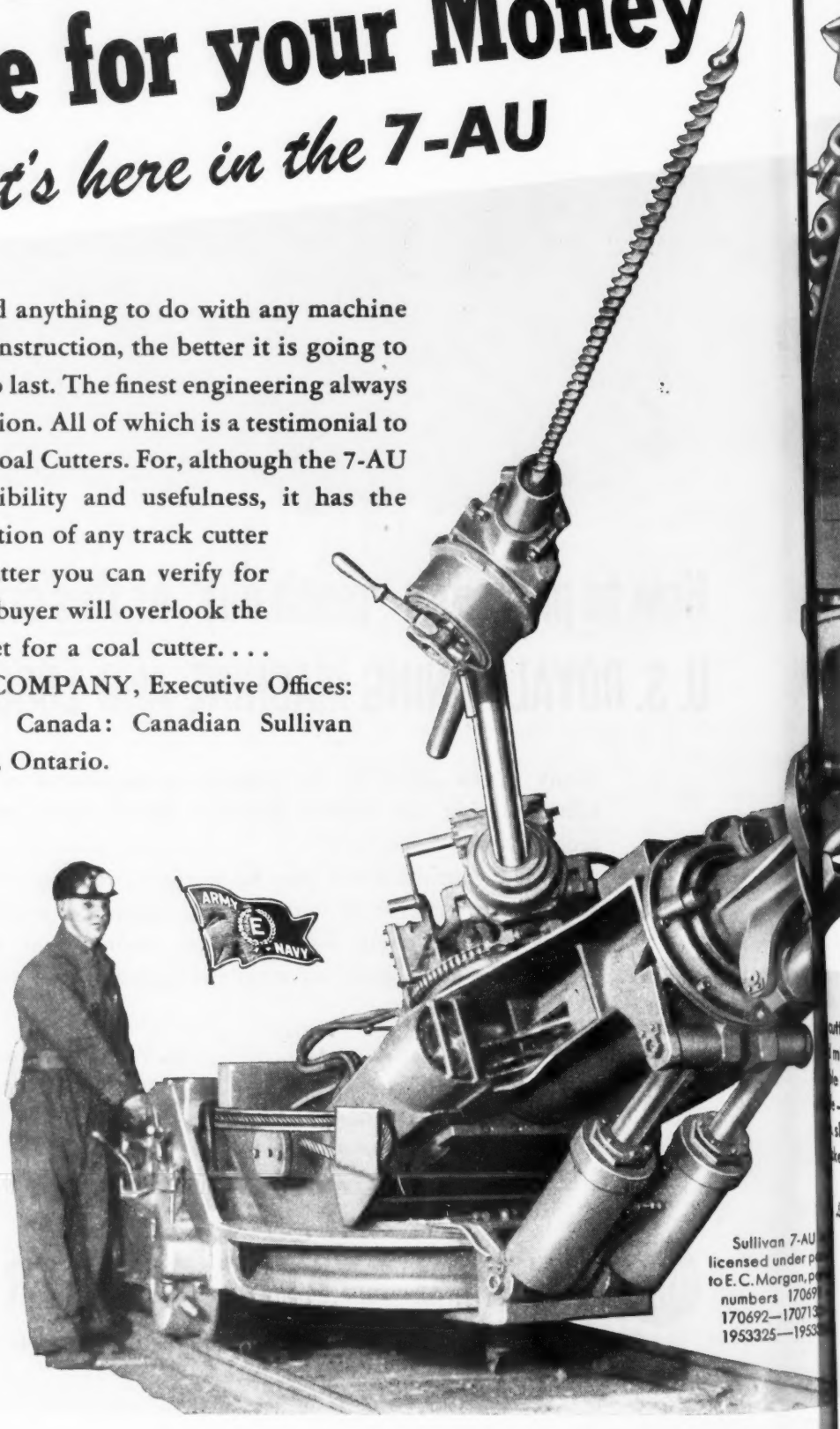

Sullivan 7-AU
licensed under p
to E. C. Morgan, p
numbers 17069
170692—1707
1953325—1953

★ Simple Construction with Only 20 Gears and 6 Hydraulic Valve-Levers.

★ Horizontal Cutting Range with Hydraulic Cylinder Type Roll, 41 Feet and 1 Inch.

★ Cutting Height from 10 Inches Below Rail to 8 Feet 6 Inches Above.

★ Shears Parallel Cuts 21 Feet 8 Inches Apart.

★ 2 Cuts with One Laying of Track.

★ Cuts and Shears Room Necks Without the Laying of Turnout Switches.

★ Cuts Over Large Amounts of Broken-Down Draw Slate.

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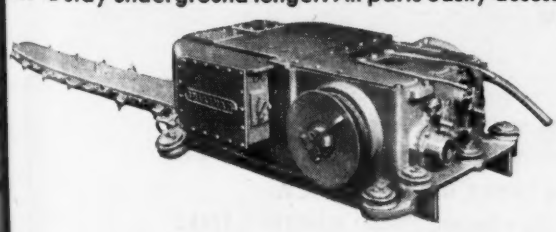
MODERN MACHINES FOR EVERY MINING METHOD

Coal Mining Machines • Scraper Haulers • Rock Loaders • Hoists • Car Pullers • Air Compressors • Coal Drills • Rock Drills • Cutter Bit Sharpeners and Heaters • Core Drills and Contract Core Drilling

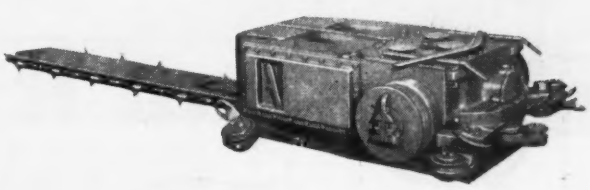
7-B SHORTWALL CUTTER

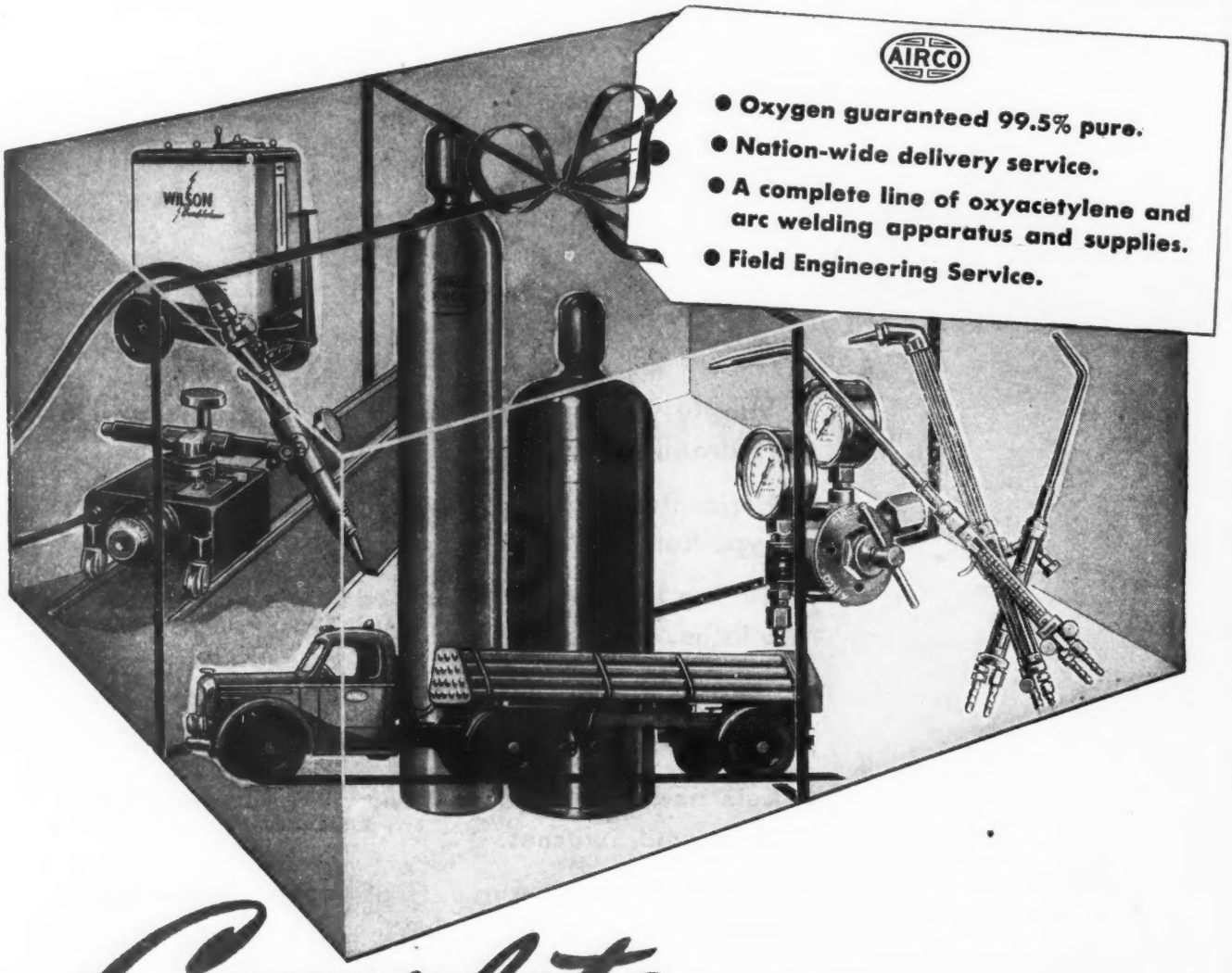
utter that stays well ahead of the loader. For modern mech- mining. Handles up to 9-foot bar. Two-direction operation. e feed control for hard cutting or worn bits. Easy to handle. —has splash lubrication, alloy steel gears and pinions, slow speed motor. Superior, through and through construc- ies 7-B stay underground longer. All parts easily accessible.



11-B CONVEYOR TYPE SHORTWALL CUTTER

21" high, cutting a 6" kerf yet it delivers cuttings to the rear. 58 inches long, 20, 35, or 50 h.p. Tough, speedy, easy to move and position. Foolproof, convenient operation. Simple controls handled from rear or side. Rugged, accessible construction. Splash lubrication. Anti-friction bearings, alloy steel gears and pinions. Big-load-starting motor.

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● Nation-wide delivery service.
● A complete line of oxyacetylene and arc welding apparatus and supplies.
● Field Engineering Service.
WILSON

A *Complete* OXYGEN SERVICE IN ONE PACKAGE...

Whether your needs are for 122 cu. ft.—20,000—or several million cubic feet of oxygen monthly, Air Reduction's complete service meets all your oxygen needs.

Airco oxygen is guaranteed 99.5% pure . . . uniform from coast to coast. It assures maximum speed and economy in metal cutting . . . promotes greater efficiency in welding. Airco's nation-wide network of offices and plants assures dependable deliveries to any point in the nation.

Air Reduction also manufactures a complete line of apparatus and supplies for welding, cutting and all other applications of the oxyacetylene flame and electric arc. In addition, its nation-wide Field Engineering Service offers technical aid—including development of mechanical flame and arc applications and design of gas pipeline systems for your plant.

Whatever your need for oxyacetylene welding and cutting, Air Reduction's complete service will meet all your requirements. There's an Air Reduction office located within close reach of your plant.

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Ground Crew

Next time you see a bomber overhead—stop and think for a minute of what it took to put it up there.

Think of the aluminum that sheathes its sleek lines . . . aluminum from a plant that was only a blueprint yesterday. Think of the propellers and the engines that drive it . . . propellers and engines from factories that were only corn fields the summer before. And think of the men who fly it and fight it . . . men schooled at air fields and training stations which were created virtually overnight.

All of these facilities and more were required to put that bomber up there . . . and all of them were provided by a vast ground crew that numbers its men and machines in the millions—America's Construction Industry.

Here, again, is a job that called for the best in every man and every piece of equipment . . . a job that required power of proven stamina, economy and dependability . . . a job that demanded nothing less than *Cummins Diesel Power*. CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the sixth and last in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. In the construction field, Cummins Dependable Diesels are used to power all types of heavy-duty dirt moving and material handling machinery—trucks, shovels, draglines, tractors, compressors and many other kinds of equipment. The giant 60-yard Tournapull illustrated here is powered by a pair of 200 hp. (Supercharged) Cummins Diesels.

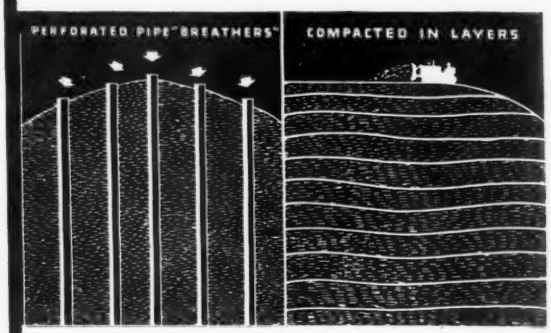
STOP COMBUSTION FIRES

... by piling coal this Safer, More Economical Way!

Next time you have a lot of coal to pile, try compacting it as you pile it with a bulldozer or trail-builder. Besides eliminating the hazards of costly combustion fires, this modern method of piling enables you to store up to 15% more coal in a given area. It also saves BTU content by reducing oxidation. How do we know? Because leading mine operators and large coal users everywhere are getting results like these consistently with LaPlant-Choate dozers. For more information, see your LaPlant-Choate-"Caterpillar" distributor or write: LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

Save Manpower and Expensive Equipment
"Do It With a Dozer!"

In addition to piling coal, LaPlant-Choate dozers are keeping busy day and night on many properties —building access and delivery roads . . . cleaning out gondola cars . . . reclaiming culm banks . . . cleaning up around shovels . . . removing spoil and a "hundred-and-one" other tasks formerly done by hand labor or expensive equipment. How about your operations? Have you checked to see which ones can be done faster, cheaper, better with a bulldozer and one good operator? You'll be surprised with the "upped efficiency."



THE OLD WAY

Operators used to pile coal loosely with a clam shell or drag line and then insert perforated pipe "breathers" at frequent intervals to reduce the danger of combustion fires. This idea proved unduly expensive and required extra storage space.

THE MODERN WAY

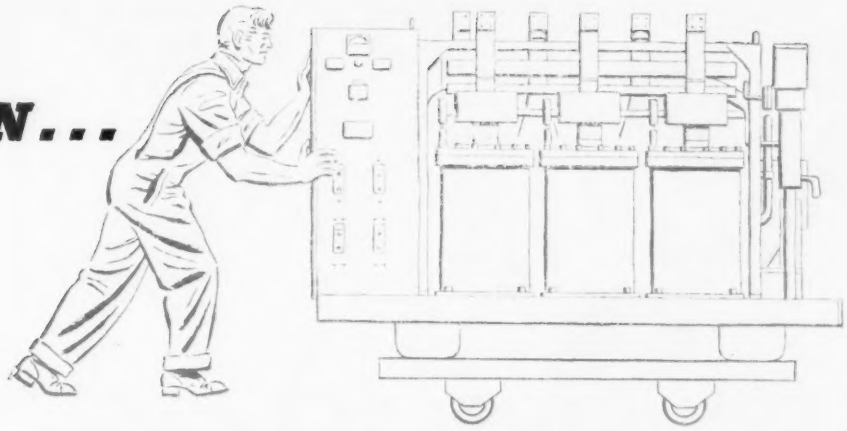
Today many progressive operators pile their coal with bulldozers or trail-builders and pack it tightly in shallow layers. This way all voids are eliminated and combustion fires are effectively prevented at a considerable saving in time, money and space.

LaPLANT-CHOATE

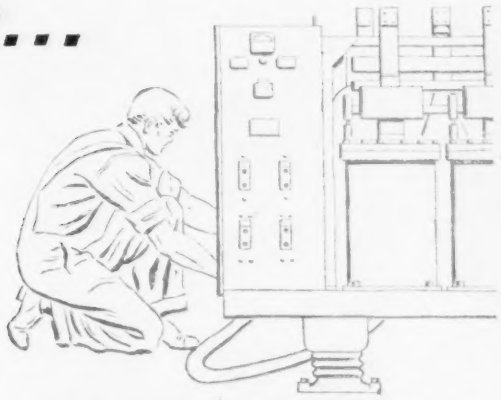
Earthmoving and Land Clearing Equipment

ARMY E NAVY

MOVE IT IN...



CONNECT IT...



It's easy to install an Ignitron Rectifier power conversion unit. Just move it on any reasonably level floor—connect the control leads, power leads and water supply—and it's ready to go to work. No air ducts or ventilating systems are required.

As the d-c load center changes, the entire Ignitron substation can be moved to new locations. Because of their lightweight, Ignitrons have been installed on balconies, since no special foundation is required.

Simplify your power conversion equipment. Save time—save money—save space. Specify Westinghouse Ignitron Rectifiers—a product of Westinghouse Electronic Research.

FORGET IT

IN THE MINING INDUSTRY

Both stationary and portable Ignitrons are available for mining service. They can be moved readily as the working area changes in the mine . . . are simple, reliable, efficient.

Ignitron Rectifiers are not damaged by momentary overloads or even short circuits. High load swings are handled readily.

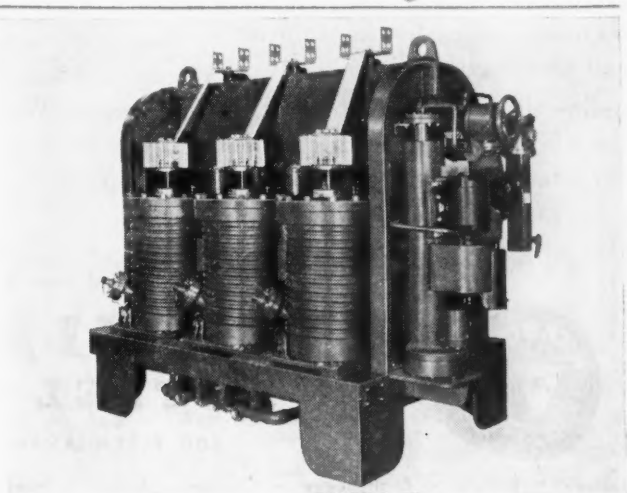
For complete information about the Ignitron Rectifier write for Book B-3024. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-10261-3

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

IGNITRON RECTIFIERS

Electronics at Work

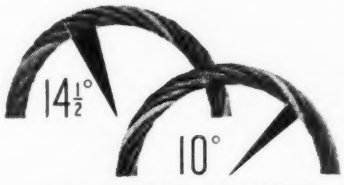


"Hard worker...this Buddy of mine"

When there's a road to be built, or a runway constructed through marshy jungles, important jobs are being done with good, stout Wickwire Rope. In fact, Wickwire Rope was a buddy to many of the men before the war when they were working in oil fields, mines, forests, shipyards and construction jobs.

Seeing that our fighting forces get the wire rope they need is part of our job. Of course, we realize (and they do too), that you also need wire rope to do your bit toward getting supplies to them. It helps speed the day of victory when you make each length you now have last longer.

Proper selection, application and usage of wire rope will make it last longer. If you have a particular wire rope problem we will be happy to be of service. Write Wickwire Spencer Steel Company, 500 Fifth Avenue, New York 18, N. Y.



WHAT ROPE IS BEST ON SMALL SHEAVES?

Our FREE book "Know Your Ropes" gives the answer to this and other wire rope questions. Its 82 pages contain 78 "right and wrong" illustrations, 40 wire rope life savers, 20 diagrams, tables, graphs and charts.

SEND FOR YOUR FREE COPY

Send your wire rope questions to:

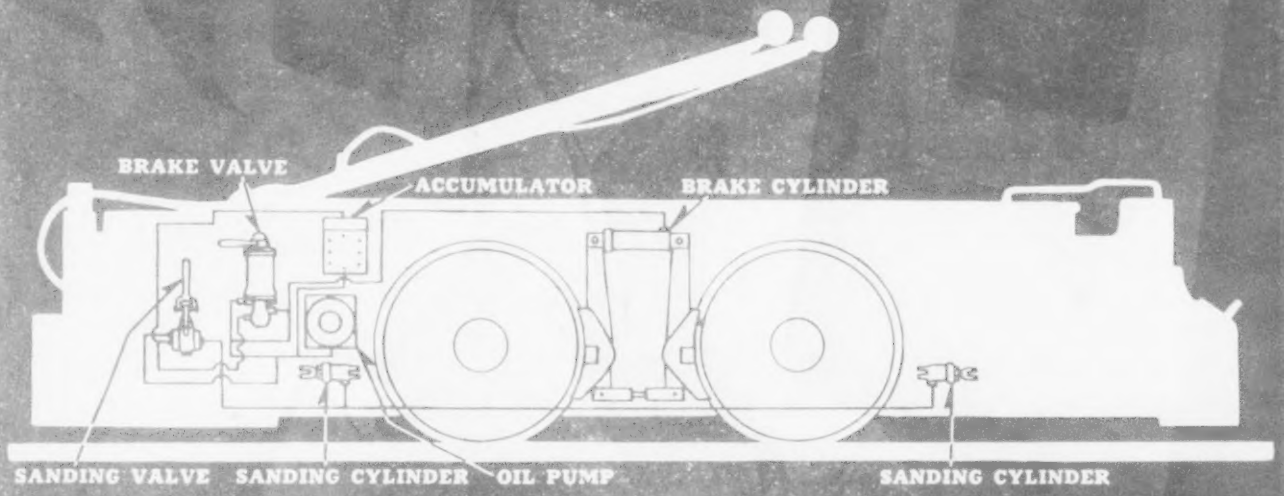
WICKWIRE SPENCER STEEL COMPANY

500 FIFTH AVENUE, NEW YORK 18, N. Y.

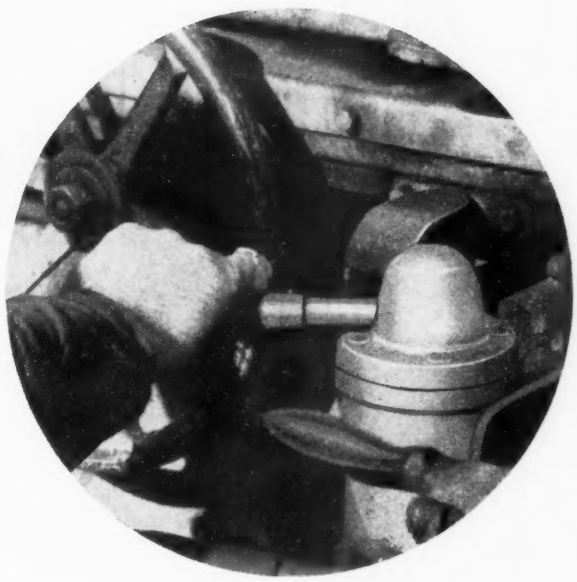
STANDS FOR FRIENDLINESS

Abilene • Buffalo • Chattanooga • Chicago • Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester

Outline for Greater Production



WESTINGHOUSE Hydraulic Brake



IN OUTLINING greater production goals, think of the big lift that can be had with this power brake.

On your present locomotives it would handle the extra loads that might require an additional locomotive—if it could be had.

Handling ease would take fatigue off the operator—keep him alert through the extra hours.

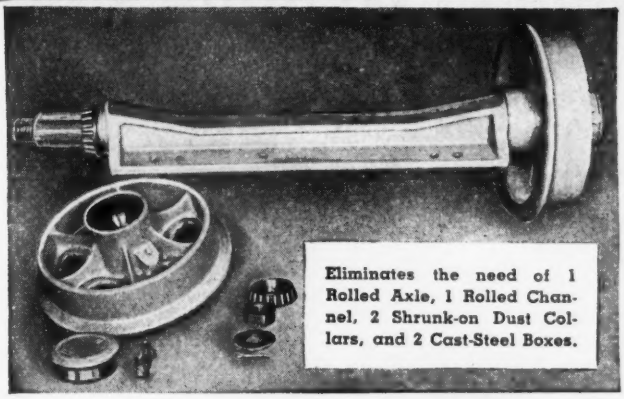
And, best of all, it would take the braking load off the motors—keep them in service and reduce repair bills.

Easily Applied to Old Locomotives

WESTINGHOUSE AIR BRAKE CO.

INDUSTRIAL DIVISION - WILMERDING, PA.

PROX
FOUNDED
1875
"COAL TEETH"—the Prox alloy tool steel precision hardened double point bits —put more bite in any mining machine.
Direct bit cost per ton is a minor factor among others that overshadow its importance in appraising the real value of any particular type of coal cutting bit.
24 HOUR BIT SHIPMENTS
FRANK PROX COMPANY, INC.
TERRE HAUTE. INDIANA- 1205 S. FIRST STREET



IMPORTANT

NEW

PRODUCTS

DUNCAN

Integral-Cast

STEEL AXLE

•

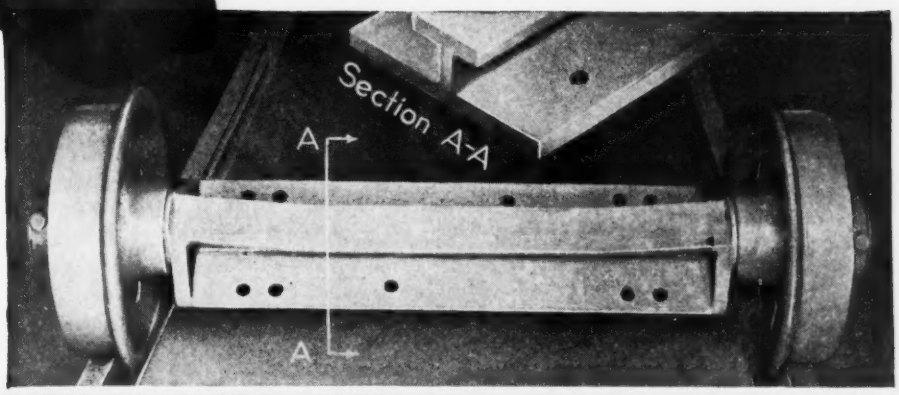
CAST STEEL WHEELS

★ With treads cast to an accuracy almost equal [illegible]ed surf[illegible] The quick, dependable, low-cost way to build [illegible] mine cars [illegible] your own shops—with the DUNCAN Integr[illegible]el Axle and cast steel Wheels.

Careful controlled chemical properti[illegible]oper heat-treating make DUNCAN Integral-Cast Steel Axl[illegible] strength to a rolled axle. They weigh 125 lbs. and repla[illegible]t weight. The following results were obtained by placing t[illegible] hydraulic press, each bolted flat on face of press and be[illegible] angle on each end of axle—CAST AXLE . . . 225 tons—R[illegible]XLE . . . 200 tons—neither axle showing sign of fracture.

[illegible]xles h[illegible]d for years on automotive trucks and trailers [illegible] Investigate today and see how you can use them [illegible]t us tell you how mines can save money, time, and [illegible]UNCAN Integral-Cast Steel Axles and cast steel wheels.

DUNCAN FOU[illegible]DRY & MACHINE WORKS, INC., ALTON, ILLINOIS



Goggles . . . Helmets . . . Respirators . . . Safety Clothing . . . Welding Glass

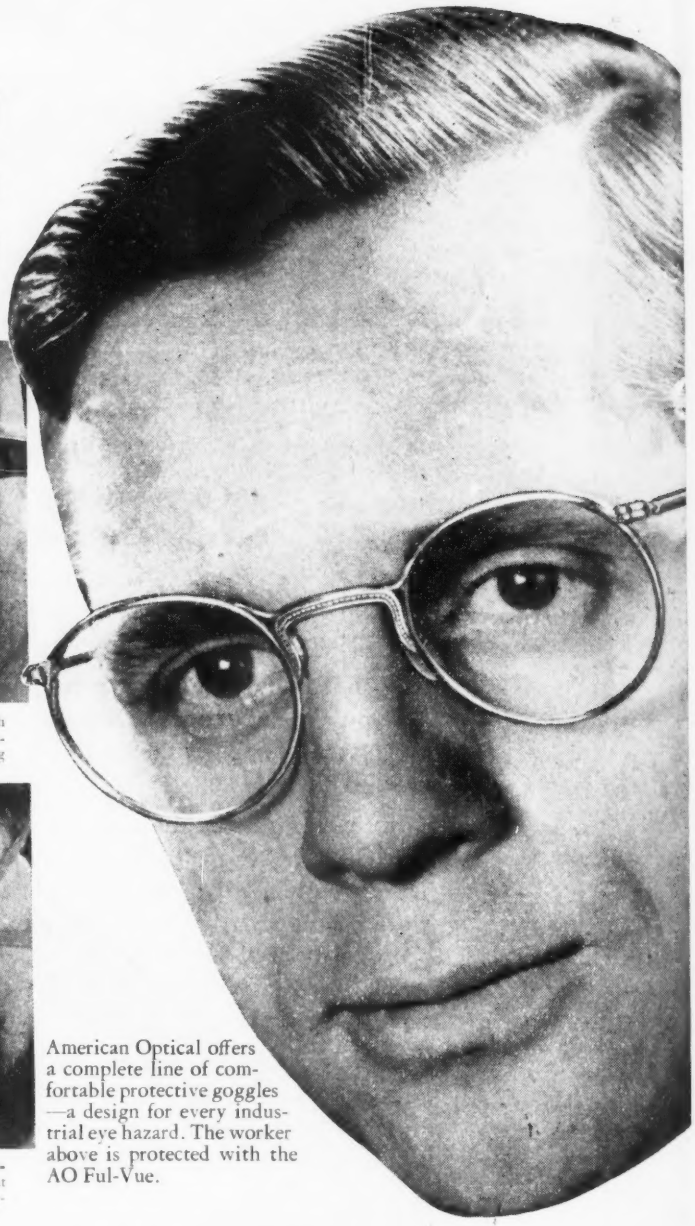
...Look to American Optical for the Personal Protection Equipment Your Men Need!

AO Welding Glass for welding goggles includes Noviweld-Didymium, Noviweld and Calibar—all developed by AO Scientists.

Sturdy AO Goggles, equipped with Super Armorplate lenses, offer the eye-protection miners need against flying chips.

AO Welding Helmets are designed to provide maximum protection, flexibility and comfort. Equipped with AO Filterweld Plates.

The American R-9100-T Respirator is light, allows full vision, filters out dangerous toxic dusts. Comfortable facepiece easily adjusted.



American Optical offers a complete line of comfortable protective goggles—a design for every industrial eye hazard. The worker above is protected with the AO Ful-Vue.

American Optical Company head-to-ankles protection is *stay-on-the-job insurance* for your men. AO Goggles are scientifically designed to give lightweight, comfortable protection for every type of eye hazard in your plant. AO Safety Clothing—of which there are complete lines for men and women—is made to withstand long, strenuous wear, designed and constructed to give comfortable, good-looking fits.

And in addition, American Optical offers you a quickly accessible "base of supply" for AO Safety Equipment, from which is also available the assistance you need to put these products into most effective use. These aids include informative literature, plant analysis of eye hazards, dramatic posters, quickly and easily understandable guides, a goggle adjustment training film and the services of a trained American Safety Representative.

Get in touch with your nearest American Optical Company Branch Office . . . ask to see the complete AO line.

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

★ A PATTERN FOR PROGRESS ★

It is a basic belief at Thermoid that no one prospers alone . . . that success for worker, owner and customer is interdependent; and that employee welfare is governed by individual striving to advance the interests of all.

This concept of a common good by Thermoid men and women is unusual in so large a group. It is that sense of proprietorship and personal responsibility felt by the employee who works alongside the owner's bench or desk. And it is bred, here at Thermoid, by the same intimate employee knowledge and understanding of the business that unifies effort in the small shop. It is fed by sharing problems and profits.

Speaking to every member of the Thermoid family—in annual reports like the one pictured here—President Schluter gives fullest expression to his belief that "employees do a lot of thinking for themselves; and the more a man knows about the thinking behind his job, the more worthy his work will be."

★ ★ ★

THE THERMOID LINE INCLUDES: TRANSMISSION BELTING • F.H.P. AND MULTIPLE V-BELTS AND DRIVES • CONVEYOR BELTING • ELEVATOR BELTING • WRAPPED AND MOLDED HOSE • SHEET PACKINGS • INDUSTRIAL BRAKE LININGS AND FRICTION PRODUCTS • MOLDED HARD RUBBER AND PLASTIC PRODUCTS.

What Thermoid does . . . what it makes . . . what it sells—and how and where . . . what taxes it pays . . . its wage rates . . . its earnings . . . its dividends and reserves . . . its plans and its problems! All are set forth frankly in the Thermoid Annual Report to Employees as matters of mutually helpful information.

This fuller knowledge of company relationships, with the better understanding of their mutual problems by every worker, is largely responsible for Thermoid's consistent progress. It patterns the cooperation that gets things done RIGHT . . . that causes Thermoid customers to say: "It's good business to do business with Thermoid."

Thermoid Rubber

DIVISION OF THERMOID CO.

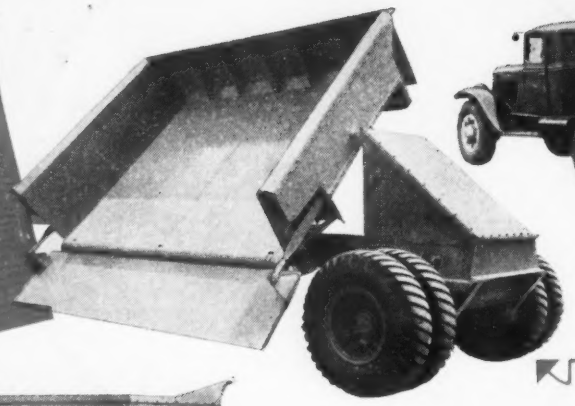
TRENTON, NEW JERSEY

Don't put it off 'til tomorrow—
BUY MORE WAR BONDS TODAY!

It's Good Business to Do Business with Thermoid

Western

SIZES AND TYPES FOR ALL REQUIREMENTS



10-TON

35-TON

16-TON

50-TON

Rocker beam, tandem axles with transverse and vertical oscillation.

20-TON

30-TON

25-TON

TRAIL CARS

DOMINATE THE STRIP MINES

INTRODUCED ten years ago, with a background of over 50 years of dump car manufacturing; first to use air-operated and hydraulically-operated clamshell type doors; made in two types and in capacities of from 6 to 65 yards, carrying loads of from 10 to 60 tons; there are more "Western" Trail-Cars in use in coal strip mines today than all other tractor-truck trailer units combined.

Hopper-type Trail-Cars have quick-acting, bottom discharge, automatic air-operated, high-clearance clamshell doors controlled by the truck driver. The doors swing sideways, upward and outward, providing maximum clearance. The only semi-trailer with air-operated doors. Can be dumped anywhere. Alloy steel construction provides greater pay loads with less dead weight. New railroad-type coil spring suspension reduces sidesway and spillage to minimum; fewer spring replacements.

Side-dump Trail-Cars are of the one-way or two-way side-pivot, tray-type or drop-door type with automatic hydraulic dumping mechanism operated by the truck driver.

Our engineering and manufacturing facilities are always available for the production of special equipment to meet unusual requirements.

"99-M" POWER GRADER

The "99-M" Power Grader with its All-Wheel Drive and All-Wheel Steer operates efficiently under adverse soil and ground conditions where ordinary motor graders would find it difficult or impossible to operate.

Bulldozer and other attachments are also used more efficiently because of the "99-M's" greater traction and maneuverability.

World's Largest Manufacturer ARMY E NAVY *of Dump and Trail-Cars*

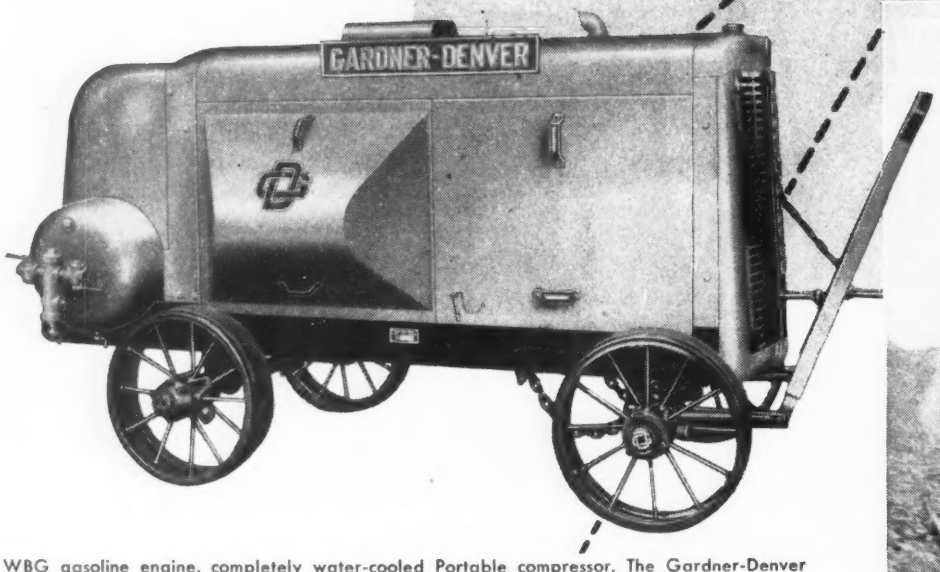
AUSTIN-WESTERN COMPANY

(Formerly the Western Wheeled Scraper Company)

AURORA, ILLINOIS • CABLE ADDRESS: AWCO, AURORA

Austin-Western also builds Power Graders, Rollers, Shovels and Cranes, Street Sweepers and a complete line of Rock Crushing and Screening Plants and kindred equipment.

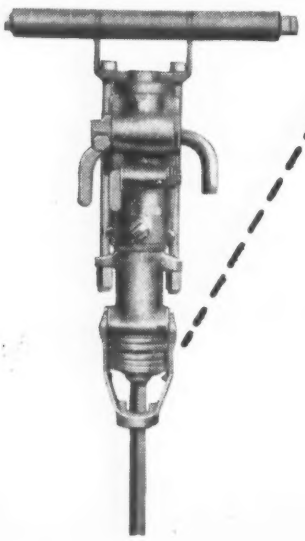
THE MARK OF BETTER PERFORMANCE



WBG gasoline engine, completely water-cooled Portable compressor. The Gardner-Denver complete line of dependable compressors includes both gasoline and Diesel engine-driven models, completely water-cooled for efficient performance, regardless of temperature or altitude extremes.

UM 99 Wagon Drill—for convenience in stripping operations where frequent moves over rough ground are necessary. Plenty of power for the deepest holes and fully adjustable for down holes, toe holes or line drilling.

Gardner-Denver S-33 Hammer—31 pounds of easy-riding power for every drilling need. The conveniently located blow valve is highly effective in cleaning the hole, whether drilling in coal, shale, or rock.



WHEN you invest in equipment bearing this Gardner-Denver symbol, you are immediately sure of three things:

First, that this equipment is designed to help speed your operations . . . to render efficient, dependable service under all types of working conditions.

Second, that this design is based on field experience by trained engineers who are familiar with the problems of strip mining.

Third, of inherent quality that means greater stamina . . . low operating and maintenance costs.

For complete information on Gardner-Denver Portable Compressors, Hammers, and Wagon Drills, write Gardner-Denver Co., Quincy, Ill.

GARDNER-DENVER Since 1859

BEFORE BUYING A TRANSFORMER

ASK YOURSELF THESE QUESTIONS

1 Can the transformer be installed indoors, at the load center, where voltage drop would be reduced and copper saved?

2 Will an indoor installation require an expensive fire-proof vault or fire wall?

3 Does the surrounding air contain impurities which might adversely affect transformer reliability and life?

4 Can lightning surges and switching transients reach the transformer, either direct or through the main supply transformer?

5 In a plant rearrangement later, is it likely that the transformer will be moved outdoors, or to some other indoor location?

6 How much maintenance will be required?

7 In an emergency, will the transformer handle sustained overloads?

8 Is there any chance that the transformer will sometime be partially or totally submerged in water?

**Reg. U.S. Pat. Off.*

GET THE RIGHT ANSWER WITH PYRANOL TRANSFORMERS

1 You can *safely* install Pyranol* transformers indoors. Never has one burned or contributed to a fire.

2 No vaults are required with Pyranol transformers. You can install them anywhere (even on the roof, in the basement, or on overhead beams), thus saving time, floor space, and construction materials.

3 Pressure-tight tanks protect the vital parts of Pyranol transformers from dust, dirt, fumes, dampness, and accidental damage.

4 Pyranol transformers have high impulse strength against voltage surges—permitting dependable protection by valve-type arresters.

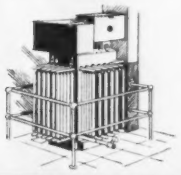
5 The completely sealed tanks of Pyranol transformers make any future change to an *outdoor* installation "a natural." Their inherent safety makes it possible to relocate them *indoors* anytime, anywhere.

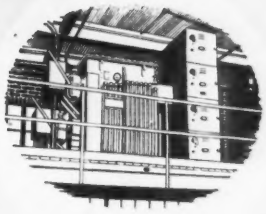
6 Because dust, dirt, and moisture can't get into a Pyranol transformer, and since Pyranol is nonoxidizing and nonsludging, little or no maintenance is necessary.

7 The heat-storage capacity of the core-and-coils and of the cooling liquid make the Pyranol transformer ideal for sustained emergency overloads.

8 Pyranol transformers are pressure-tight. Even after three days' submersion in a torpedoed tanker, Pyranol transformers were found unharmed.

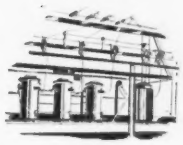
ON THE FACTORY FLOOR

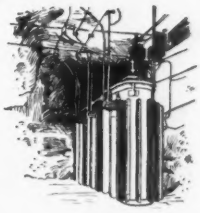




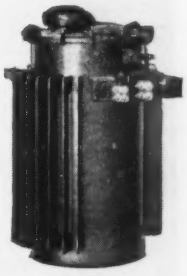
ON OVERHEAD BEAMS

ON ROOF TOPS





IN MINES



ALL-PURPOSE

PYRANOL TRANSFORMERS

For further information ask your G-E representative, or write for Bulletin GES-2974. *General Electric Company, Schenectady, N. Y.*

BUY WAR BONDS

GENERAL ELECTRIC

402-61-6100

Uncle Sam

F-1 Crew 2-5-44

F-1 Coal Loading Crew At Isabella Hangs Up New Daily Mark Of 708 Tons

The F-1 crew Saturday established a new high mark for one loading machine at the Isabella mine of the Weirton Coal company by loading 708 tons of coal in one shift. The record was made in the 43 north pillar section and tops the record of 683 tons made January 11 by the C-3 crew in 62 south development section.

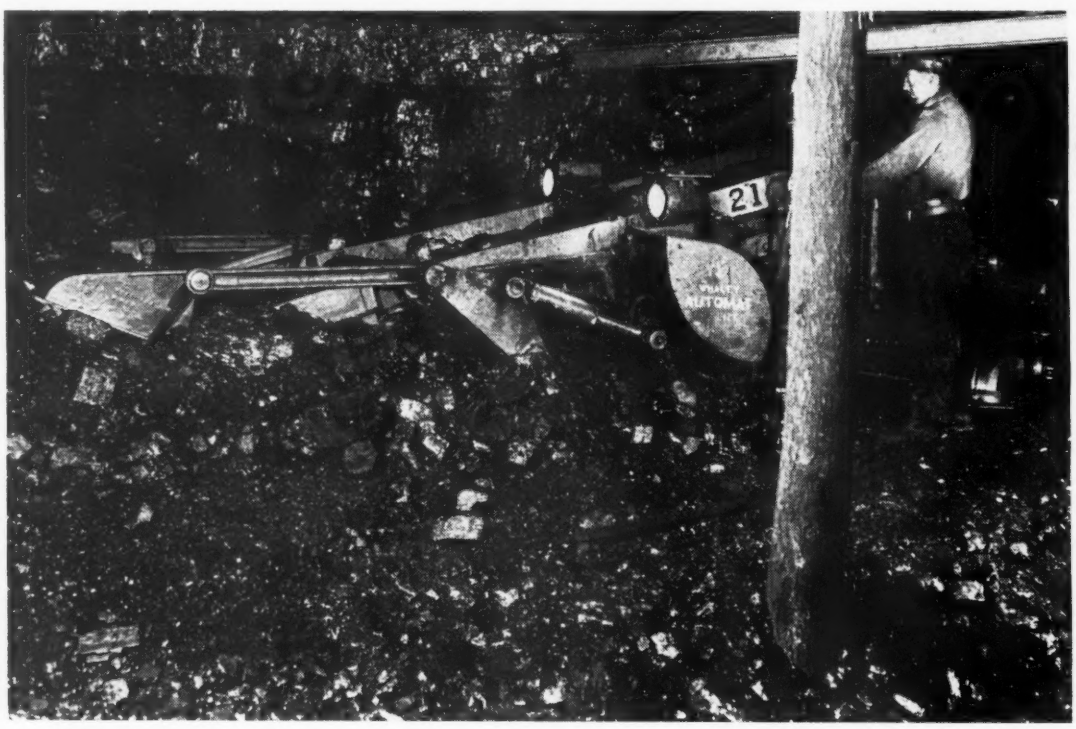
The new mark is believed not only a mine but a district record.

After establishing the record Saturday night members of the crew were treated to a dinner in Dan Viega's restaurant in Republic. The record-breaking crew includes:

Joseph Brown, loader operator; Donald Balsley, loader helper; Paul Cseko, motorman; Chester Glover, snapper; Anthony Stock, cutter; Carl Berardi, cutter; William Beggs, driller; Ralph McGraw, driller; Matthew Pitts, shotfirer; Mike Kobaly, timberman; August Warsack, timberman; Andy Ruschin, timberman; James May, timberman; Carl May, timberman; Joe Walnis, Regish, trackman; Mike Knapik, trackman; Frank Skoda, trackman; M. G. Shipley, foreman.

—from the Brownsville, Pa. Telegraph 2-7-44

★ It is accomplishments like these at the Isabella Mine of the Weirton Coal Co., Isabella, Pa. . . . achievements of fighting men on the production front . . . men with stamina and the will to win that makes America great.



F-2 Cre 2-5-4

Shown at left one of the Whale "Automats" at wo on the rib line in th Isabella Mine whe triple shift oper tion has proved successful.

MYERS-WHALEY

Mechanical Loaders Exclusivel

—YOU'VE GOT FIGHTING MEN ON THE PRODUCTION FRONT AT ISABELLA . . . . .

Tonnage Record Is Established By Isabella Miners

Loading Machine Crew Hits 766-Ton Figure In One Shift

Records are made to be broken and that is just what one of the crews at the Isabella mine of the Weirton Coal company did for the second time on two successive days.

It all started last Friday when the F-2 crew established a new high mark for the 'F' pillar section, only to see this wiped out on Saturday by the F-1 crew, who not only broke the section record but also established a new high mine mark of 708 tons for one loading machine crew in one shift.

This greatly "peeved" the F-2 crew so they came right back again on the following shift and set a still higher mark of 766 tons. Members of the currently championship crew are:

Willie Pompey, timberman; George Ribarich, timberman; Charles Yowler, timberman; George Keffer, timberman; John Zajoc, timberman; Benjamin Smith, timberman; Martin Mehalik, trackman; James Cernelli, trackman; Joe Valkosak, trackman; Andrew Budinsky, trackman; Andy Strycula, cutter operator; Joseph Kosco, Jr., cutter helper; John Kosco, driller; Tony Milovich, driller; Joe Kanos, shot-firer; Andy Warsock, loader operator; George Payfor, loader helper; Thomas Glass, motorman; Bernard Zellers, snapper; Andy Rusen, bratticeman; Oscar Harvey, special timberman; Andrew Wellingham, special timberman; John Roberts, foreman.

Due to being short of men, Andy Rusen stayed over and worked a double shift, so was on both record crews.

—from the Uniontown, Pa. Herald-Standard 2-8-44

1930 TONS in ONE day, in ONE section, with ONE machine

★ The tonnage from F. section, at Isabella, for Feb. 5, 1944 was: F-3 crew 456 tons, F-1 crew 708 tons, F-2 crew 766 tons. Total for the three shifts 1930 tons.

Triple shift operation at Isabella proves what good men, good management, and good machines can do.

Loading Coal on triple shift service is nothing new for the "Automats" at Isabella. These machines have long since proved their ability to take the punishment . . . get maximum production at minimum cost per ton of coal . . . at minimum maintenance, and with their single 25 H.P. motor, at lowest cost of power.

The Whaley "Automat" is a top production machine . . . don't overlook this. It is an all-purpose machine . . . built to load any material in the mine, be it coal, slate or rock. In addition, the Automats' vertical loading action shovel makes it the safest loader known. You should investigate the modern "Automat". Myers-Whaley Co., 144 Proctor Addn., Knoxville 6, Tennessee.

Over 35 Years

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Add life to your wire ropes with LUBRICATION

One of the most frequent causes of premature wire rope failure is lack of proper lubrication. Yet lubrication is such a simple means of extending rope life that it seems incredible that rope users should overlook it. But they do.

Every American Tiger Brand Wire Rope comes to you from the factory, properly lubricated and ready for service. But factory lubrication, no matter how efficient, will not last the life of the rope. Field lubrication at regular intervals is absolutely essential. Wire rope is a machine, composed of many working parts. It requires periodic lubrication to reduce frictional wear.

Use a well-tested lubricant like Tiger-Lube which has been developed through years of study and research. Be sure that the rope surface is clean and that the lubricant is applied uniformly and thoroughly.

Lubrication is insurance against corrosion and is the safest way to prevent excessive internal and external rope wear. Lubrication will materially assist in controlling the wear on sheaves and drums and in prolonging rope life, resulting in increased operating efficiency.

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War won't wait. Production schedules all along the line must keep pace with the need for material. Coal keeps the wheels turning.

"Lump Coal" C is widely used for this reason. It is a low velocity Du Pont permissible which saves time and increases production.

When "Lump Coal" C is used, fewer drill holes are required, due to its wide-spreading range. It produces a minimum of toxic gases, which are quickly removed by ventilation. Loading the coal is made quicker and easier, because the slow-heaving action of "Lump Coal" C pushes the big lumps far out from the face. And the coal contains a large percentage of good firm lump that will easily take the hard knocks of transportation.

Get the facts on "Lump Coal" C. Ask any Du Pont representative or write E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Delaware.

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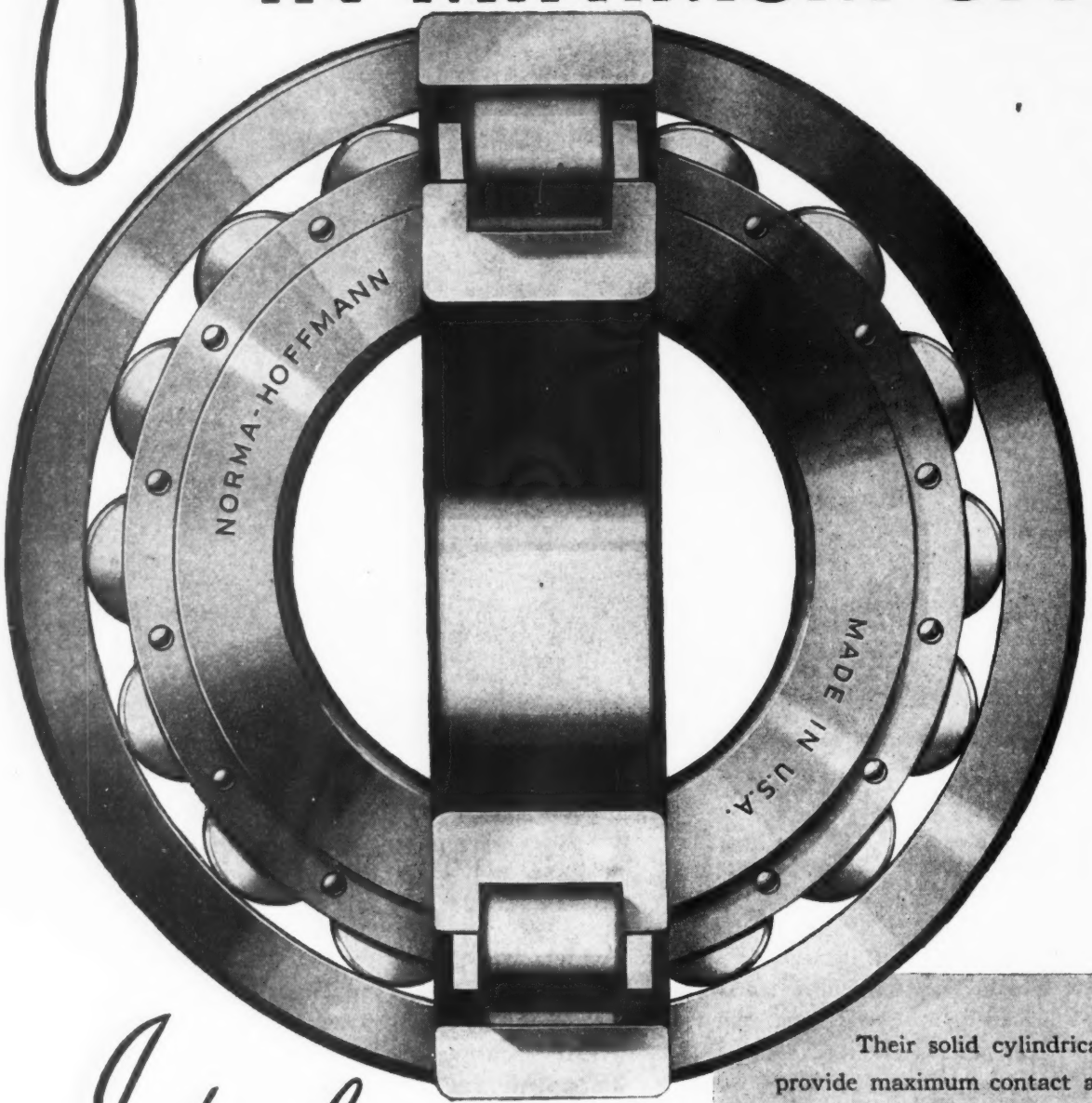

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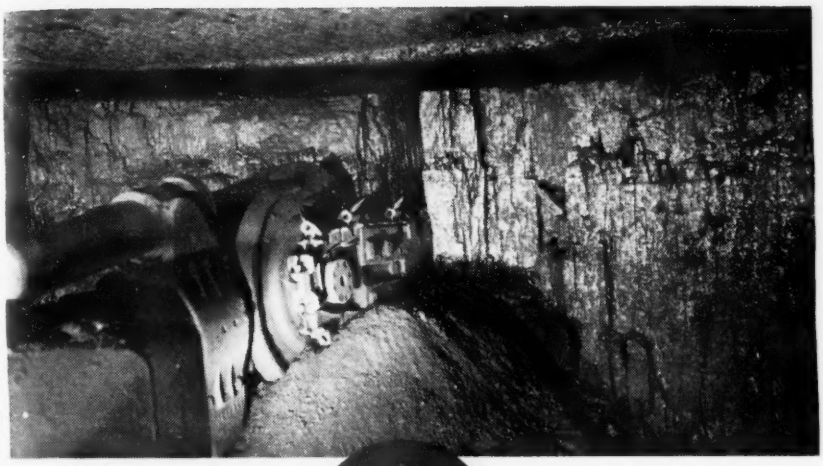

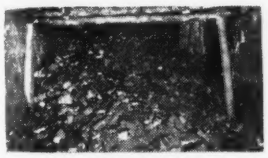

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Joy Equipment Proves its Superiority

STRONG

RUGGED

DEPENDABLE

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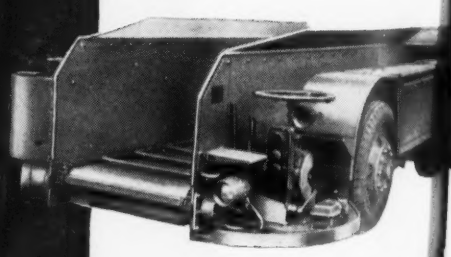
Joy Loaders and Shuttle Cars have a well-earned reputation for low maintenance. Joy engineers build each unit with complete understanding of the service it must render . . . the conditions it must face and the production capacity it must produce.

When you buy "Joy"—you buy equipment that is built to last!



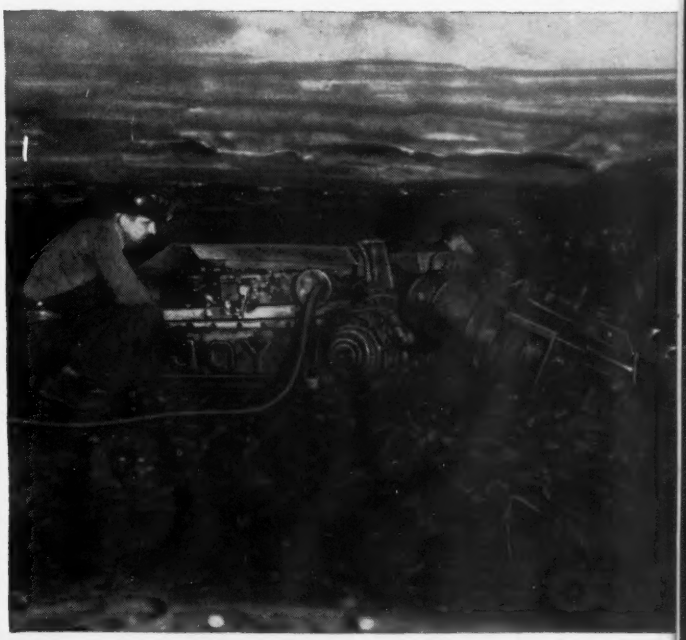
JOY 42" Shuttle Car, 6 ton ca
pacity for use in high seams.

High seam or low seam, Joy Loaders move more tonnage with less cost.

Joy Shuttle Cars' automatic conveyors provide quick, even loading.

For low seam operation, Joy Shuttle Cars offer fast, dependable haulage.

In low seam work, the advantages of Joy loaders are obvious.



Joy mechanized units are precision-built for fast, efficient operation!

JOY 32" Shuttle Car, 3½ ton capacity for low seam operations.

JOY 14-Bu Loader, only 36" high, high capacity, 5 tons per minute.

JOY 11-Bu Loader, heavy duty, high capacity, 8-10 tons per min.

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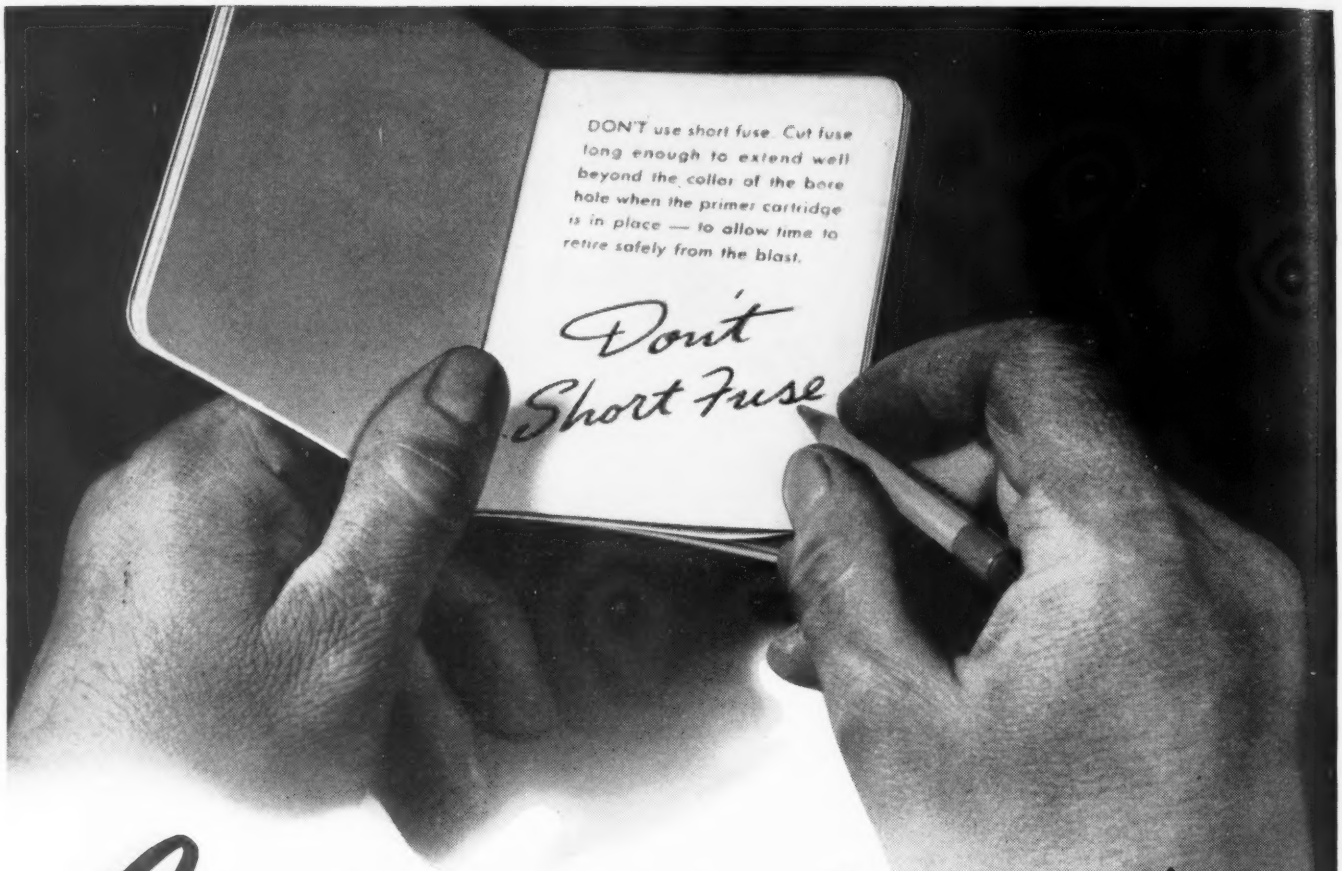
DON'T use short fuse. Cut fuse long enough to extend well beyond the collar of the bore hole when the primer cartridge is in place — to allow time to retire safely from the blast.
Don't Short Fuse

Just jot it down!

IT'S SOMETHING TO REMEMBER — EVERY DAY

Explosives, detonator and Safety Fuse are each made to do a big job correctly — when handled properly. And proper handling means close attention to every detail in drilling, loading, priming, tamping, firing . . .

Don't get careless . . . it's dangerous. Don't use makeshift methods . . . it's foolish. Take time to check and double-check. A few more minutes — and a few extra inches of Safety Fuse — are wise investments. Send for the Safety Fuse book.

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Coal Age

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Ivan A. Given, *Editor*

April, 1944

Modern Coal Production

"MORE ENERGY for your money" always has been one of coal's strongest arguments. To the ever-present problem of making that argument stick, war has added the problem of meeting greater and greater demands for tonnage. Coal was ready—as a result of having spent millions for new equipment and facilities in recent years to raise efficiency, cut cost and improve quality. Without that investment and its outpouring of engineering and managerial talent, prices would have been much higher and production much lower. But can coal rest on its laureis? The answer is emphatically no. War still demands tonnage. And the evidence indicates further rises in wage rates, material costs and other expenses in the future while the consumer still will look for low price and even greater value.

What are coal's chances in the fields of further increases in war tonnage now and cost reduction and quality improvement in the future? Encouraging is the word. Modern machinery at the face, on the surface and in between now offer even greater opportunities. When accompanied by modern methods there is every reason to believe that modern machinery can produce even more coal today; furthermore, that it can double individual efficiency in the next ten years—or less. Where the major opportunities lie and what they offer are the subjects of the feature material in this issue of *Coal Age*. These opportunities are numerous and what they promise in output, cost, quality and safety will bring coal much nearer to its twin goals: war tonnage now and prosperity in the peaceful future to come.

HOW MODERN EQUIPMENT AND METHODS CUT COSTS, INCREASE PRODUCTION, PROMOTE SAFETY

MODERN equipment and methods lead the list of things coal mining can do to cut its cost while producing more, improve the quality of its product and better its safety record. All are vital objectives now, and will be more so in the future.

What modern equipment and methods can accomplish is shown graphically in the accompanying examples, although these are not offered as hard-and-fast limits on what can be achieved. In fact, many operations have bettered the results shown. Mechanical loading and conveying can easily save up to 50c. or more per ton, as proven in numerous installations. Likewise modern preparation plants have shown how to reduce impurities to within a percent or less of the "inherent" and keep variations within ½ to 1 percent either side of the average. And real safety work can cut accident cost 5 to 10c. or more per ton with little extra effort or expense.

PRODUCTION — LOADING

HIGH COAL

❶ Hand Loading	28-30 men	240 tons
	8-8½ tons per man-shift on parting	
❷ Machine Loading	15 men	240 tons
	16 tons per man-shift on parting	

LOW COAL

❶ Hand Loading	32-35 men	240 tons
	7-7½ tons per man-shift on parting	
❸ 6-Room Conveyor Units (hand loading onto conveyors)	24 men	240 tons
	10 tons per man-shift on parting	

QUALITY — MECHANICAL

1¼-in. SCREENINGS

❶ NO CLEANING; high ash percentage; wide variations

❷ MECHANICALLY CLEANED; low ash content; little variation

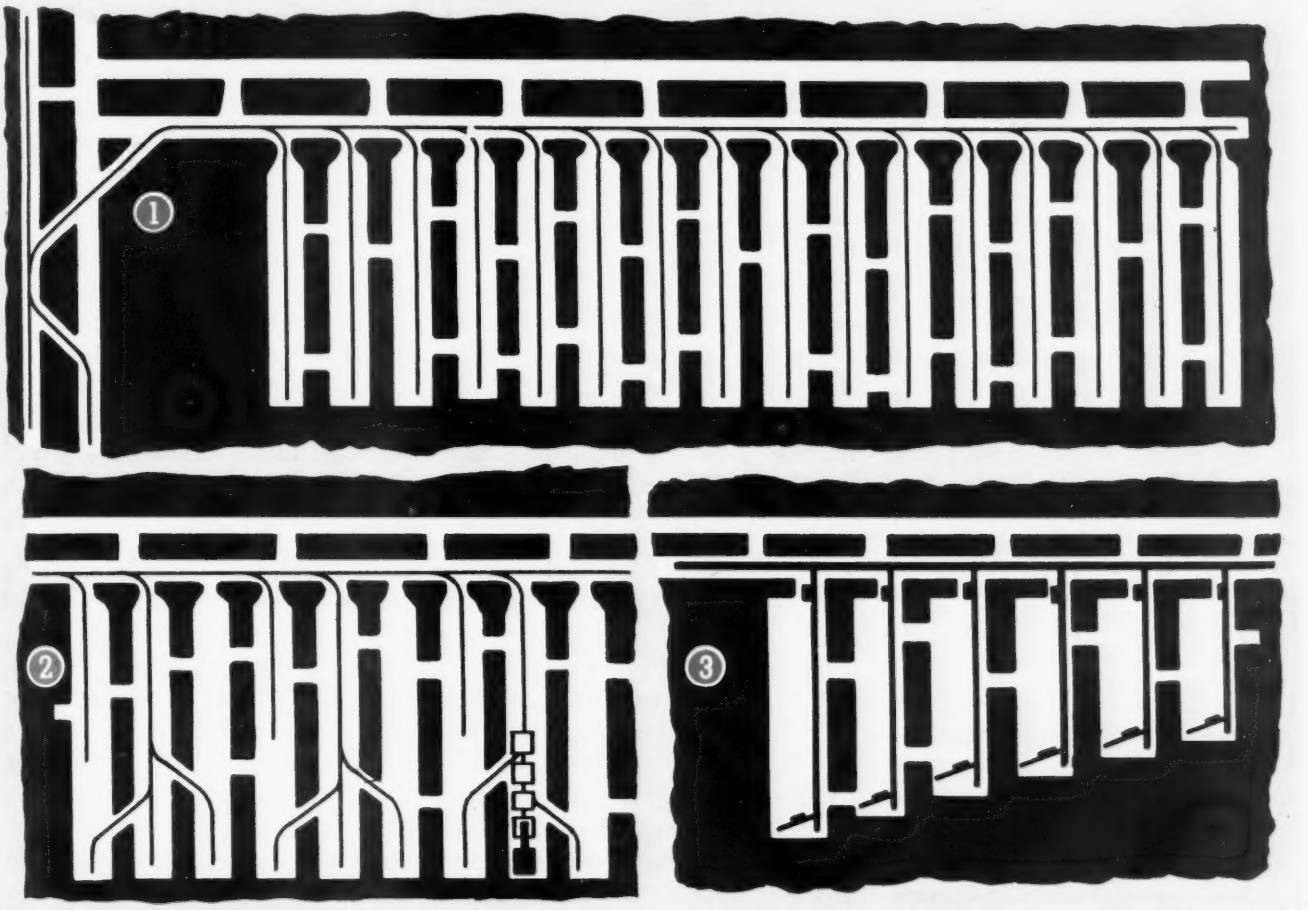
SAFETY — SAFETY

15 MEN

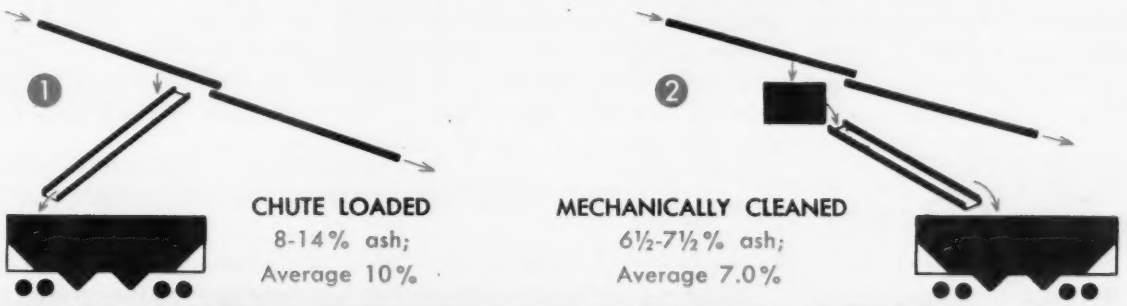
HIGH ACCIDENT RATE →

LOW ACCIDENT RATE →

AND CONVEYING RAISE OUTPUT PER MAN



CLEANING REDUCES IMPURITIES AND ASSURES UNIFORMITY



CHUTE LOADED
8-14% ash;
Average 10%

MECHANICALLY CLEANED
6½-7½% ash;
Average 7.0%

NOT ONLY SAVES LIVES – IT PREVENTS TONNAGE LOSSES

COMPENSATION COST,	→	PRODUCTION,	→	PER MAN-SHIFT,
$6 per $100 of payroll		240 tons		16 tons
COMPENSATION COST,	→	PRODUCTION,	→	PER MAN-SHIFT,
$3 per $100 of payroll		270 tons		18 tons

SAVINGS IN OPENING AND DEVELOPING

THERE IS a right and a wrong way to open a coal mine, develop it and operate it. The wrong way often is adopted as a matter of expediency—reluctance to make the initial investment necessary for long-time low cost or to wait a little longer for full production.

What are some of the things in opening, developing and operating a coal mine that insure long-time low cost? They include:

Low-Cost Layout

Pulling coal or bringing water down hill are time-honored principles. Not all properties permit of as easy a solution of the problem as that shown in the accompanying example, but hauling the entire tonnage of a moderate- or large-sized operation up a 2- or 3-percent grade when it can be avoided can add as much as 5c. or more per ton to the cost of production in extra equipment, labor, power and demand peaks. An extreme case, and not unknown, would be hoisting coal, where the seam pitches, tramming it outside and then lowering it to the plant instead of driving a rock tunnel.

Going to the back of the property and taking the coal out clean, "leaving your troubles behind you," also has been recognized as

Low-Cost Hoisting

Where drift openings are impracticable, the operator still has a chance at substantial savings through:

1. Use of slope belts.
2. Adoption of skip-hoisting.

Take hoisting. Motor size is more a matter of acceleration in this operation. With a cage hoist, one car is brought out at a time. With a skip, two or three cars. For the same output, only one-third to one-half as many trips need be made, reducing both acceleration and running speed. The power peak is cut accordingly and usually there is an energy saving also. Against these must be charged the cost of a dump and skip-loading installation on the bottom, in part offset by reduced hoist and motor cost. In a few cases, the savings prospects have led to replacement of cages with skips at going properties. This step is especially attractive at mines which can hoist only small cars. As car size increases, the spread in hoist-motor size is reduced, although the skip always has some advantage.

As for slope belts, a study several years ago (*Coal Age*, June, 1932) indicated that slope belts were cheaper in power at depths of 600 ft. or more. And the fact that practically all new mines at moderate depths, where shafts formerly would have been sunk, have been opened with slope belts in recent years is evidence of their savings possibilities. One factor favoring slope belts is the reduced cost of sinking made possible by mobile loaders and cars or conveyors, which cut cost 50 to 75 percent. Thus, while a slope might be

Low-Cost Development

New mechanical-mining equipment, as stated previously, makes it much easier and cheaper to open, devolop and operate coal mines the right way. Applications in development include:

1. Slope sinking with loading machines or conveyors or both.
2. Rock tunneling with loading machines, conveyors (with or without self-loading heads) and scrapers.
3. Entry driving with special or regular machines.

Since mechanical mining naturally has been accompanied by mechanical entry driving with the same or special units, the advantages are well known. With hand-loaded conveyors, the advance is two to four cuts per shift at savings up to 25c. or more per ton. Making conveyors self-loading increases the footage per shift (normally up to one cut or more) with a corresponding cost reduction. Similar savings are achieved with loading machines and scrapers, in addition to reducing to as much as one-third or one-quarter the time required to drive a given distance.

Slope sinking may be done by hand loading into conveyors. Even greater economies are possible with loading machines in the 15- to 18-deg. slopes driven for belts. Doubling or tripling the rate of sinking with reductions in costs (due largely to mechanical mucking) of as much as 50 to 75 percent of the rates with conventional sinking are the results. Some records are: loader onto conveyors, 7x15½

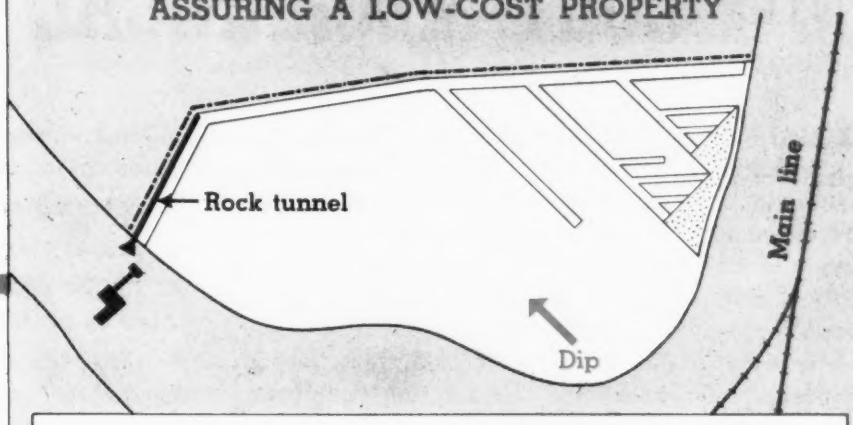
1. Thorough prospecting and drilling to show cost-cutting opportunities in subsequent development.

2. Location of openings and projection of workings for low-cost haulage, drainage and other operations.

3. Full-retreat operation.

cheapest in the long run. Full-retreat mining means operation through solid coal and good top. Savings are substantial; up to 5, 10 or more cents per ton. And, since mechanical equipment speeds entry driving and reduces cost, full retreat is even more justified.

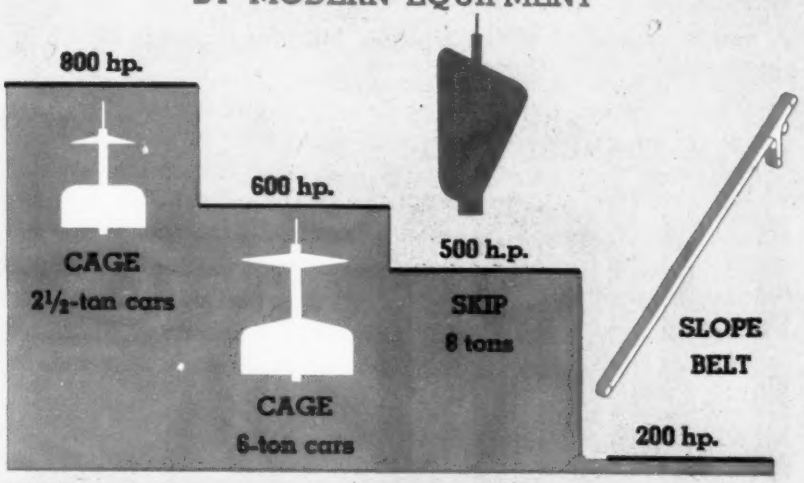
ASSURING A LOW-COST PROPERTY



FULL RETREAT — ALL HAULAGE AND DRAINAGE DOWNHILL

Gross savings over property life, at 5c. per ton	$500,000
Extra cost of railroad track and tunnel	$150,000
Net saving over property life	$350,000

HOW HOISTING HORSEPOWER MIGHT BE CUT BY MODERN EQUIPMENT



as much as four times the length of a vertical shaft, the sinking and lining cost is not proportionately greater and under favorable conditions may be the same or less.

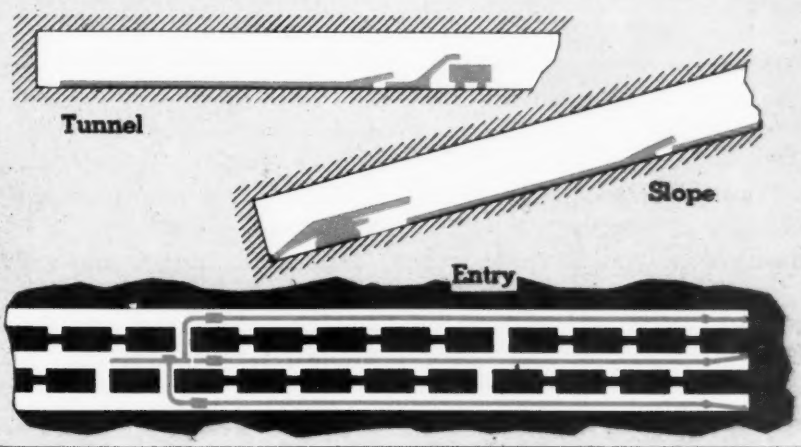
How the problem might work out under one set of conditions is shown in the accompanying diagram. Since, of course, conditions alter the final findings, the results might not be the same under another set of factors. But in this particular example, size of hoist drops progressively from 800 hp. through 600 for a bigger car, 500 for a skip and 200 for a slope belt.

ft., 7⅓ ft. per shift, five-man crews; loader onto conveyors, 7½x15 ft., 5¼ ft. per shift, five-man crews; loader onto conveyors, 7½x16 ft., 6 ft. per shift, including timbering, six man crews; loader into mine cars, 7x14 ft., 4 ft. per shift, five-man crews.

All types of mechanical equipment may be employed in driving rock tunnels, with savings as great as or greater than those achieved in slope work in rock and equal or greater speeds of advance.

MECHANICAL DEVELOPMENT

Speed — 2 to 4 times
Cost — 50% or less



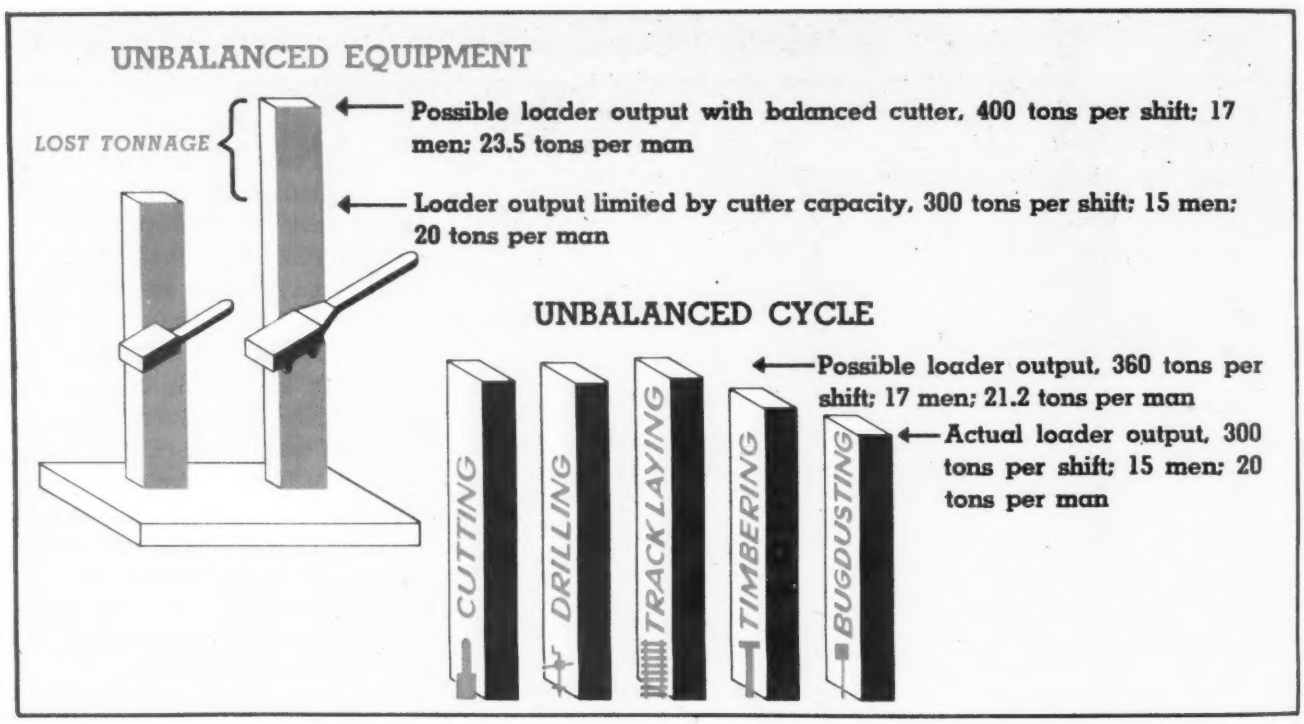
LOW-COST MECHANICAL LOADING

MECHANICAL-MINING equipment is inherently cost-cutting equipment. But it by no means follows that the maximum possibilities can be realized without further thought. To amplify, a loading machine may have a rated capacity of 1,680 tons per shift. Manifestly, the necessity for moving alone makes it impossible to realize such a capacity. But if only 300 tons is being produced when it is possible to get 600 with an equal productivity per man, the equipment is being inefficiently operated.

What are some of the major factors that affect mechanical-loading performance? They include:

1. Balanced equipment and operating cycle.
2. Proper crew size.
3. Ample coal supply, with as large a tonnage per fall as possible.
4. Good transportation service, particularly with loading machines, meaning large cars or other equipment, short change or conveyors.

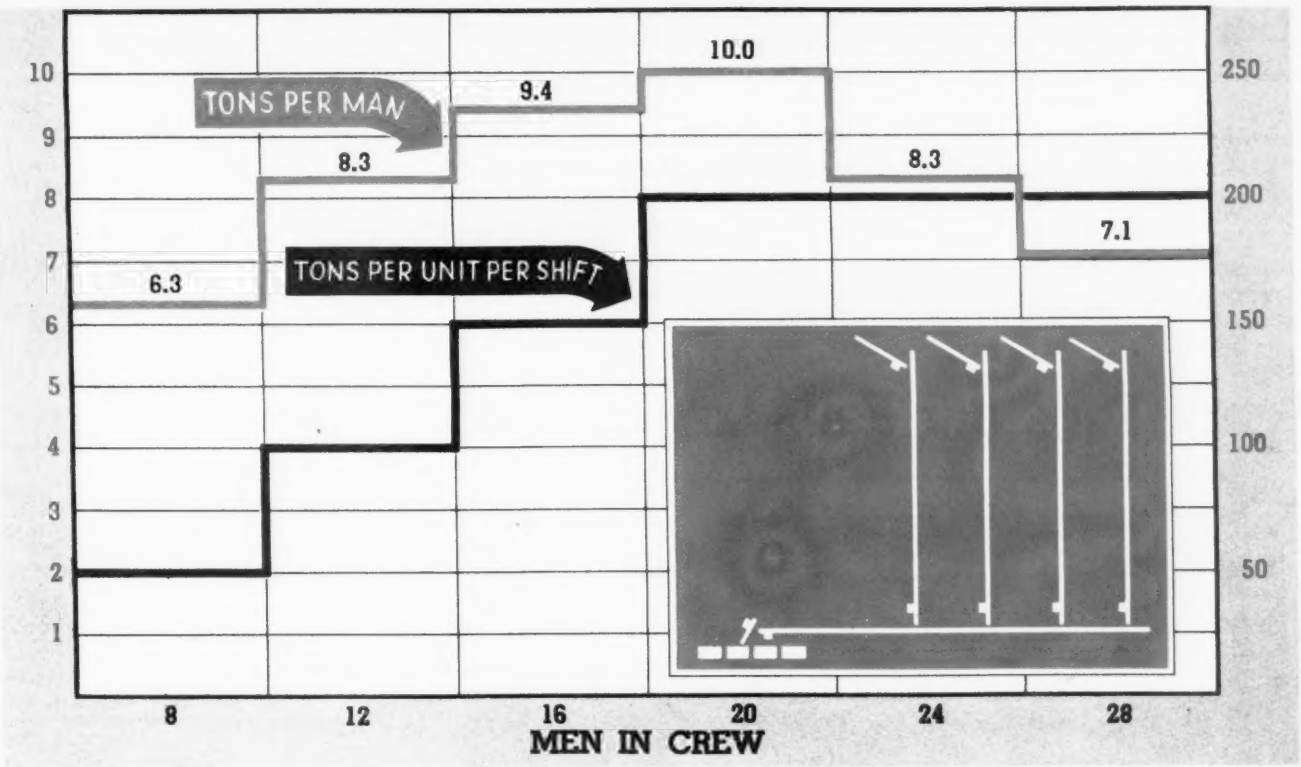
Balanced Operation – Lower Cost


UNBALANCED EQUIPMENT
LOST TONNAGE
Possible loader output with balanced cutter, 400 tons per shift; 17 men; 23.5 tons per man
Loader output limited by cutter capacity, 300 tons per shift; 15 men; 20 tons per man
UNBALANCED CYCLE
Possible loader output, 360 tons per shift; 17 men; 21.2 tons per man
Actual loader output, 300 tons per shift; 15 men; 20 tons per man
CUTTING
DRILLING
TRACK LAYING
TIMBERING
BUGDUSTING

Performance of a mechanical-loading unit can be no better than the performance of an individual equipment item or operation. Thus, if a cutting machine can cut only 350 tons while the loader can handle 500 with an equal or better productivity per man, the equipment is out of balance. One solution would be to add a cutting machine, making, say, three cutters for two loaders. This however, is the less efficient solution, as it involves a relatively higher investment and labor cost for the same tonnage. The best step is to modernize the old cutter, if possible, to handle the job or replace it with a new one with the desired capacity. Experience at many operations has proved that the savings in increased loader performance, as well as in maintenance and other items, will return the cost in two to three years.

While unbalance is most prevalent in equipment, it also is found in certain operations in the cycle. Failure to keep up timbering, track, slate handling, drainage, bugdusting, ventilation, etc., or to cut or drill properly may substantially handicap a loading unit. The classic example is failure to bugdust properly. If digging out a tight fall a shift requires 10 minutes of the time of a loading machine with a rated capacity of 4 tons per minute, the moral – and loss of coal – is self-evident.

Eliminating unbalance in effect is eliminating bottlenecks. In many cases, as indicated in the accompanying example, overhauling of equipment and working cycle for this purpose can increase production per unit and per man substantially.



Right Crew Size–Higher Productivity

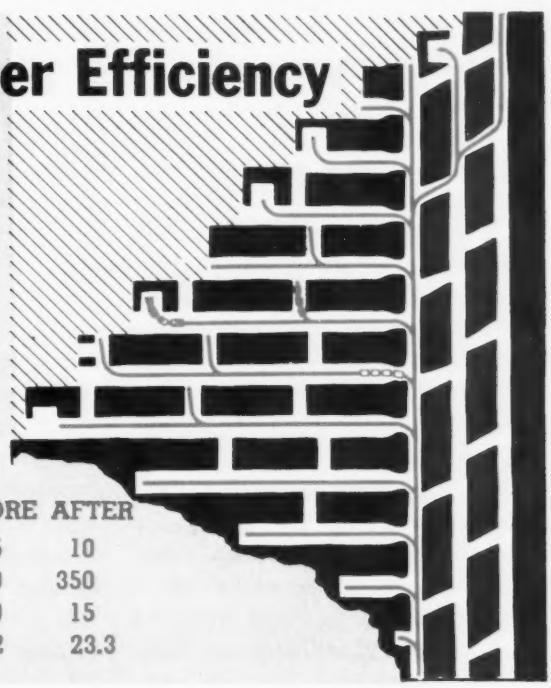
For maximum productivity from a mechanical-mining unit, whether it be built around a loading machine, conveyors or scraper, crew size should be as large as possible without reducing productivity per man. There is, of course, a limit beyond which there is insufficient work for additional men and therefore the over-all productivity per man drops. But, assuming that other conditions do not prevent it, it seems reasonable to assume that crews and territories should be enlarged to the point where output per man employed begins to dip.

This principle is brought out in the accompanying example. Up to 20 men, increases in production are sufficient to raise output per man. Beyond 20 men, there is no opportunity for additional productive work and the output per man consequently falls off.

Ample Working Places–Higher Efficiency

How much coal is available to a loading unit, particularly a unit built around a mobile loader, has a major bearing on output and productivity per man. The test is the relation between the two—output per unit and output per man. Thus, it may be uneconomical to attempt to operate a mobile loader in four to five places with 10 men and a productivity of 22 tons per man if ten places will permit producing 350 tons with a crew of 15, making the output per man 23.3 tons, as indicated in the example illustrated.

The major difficulty in operating

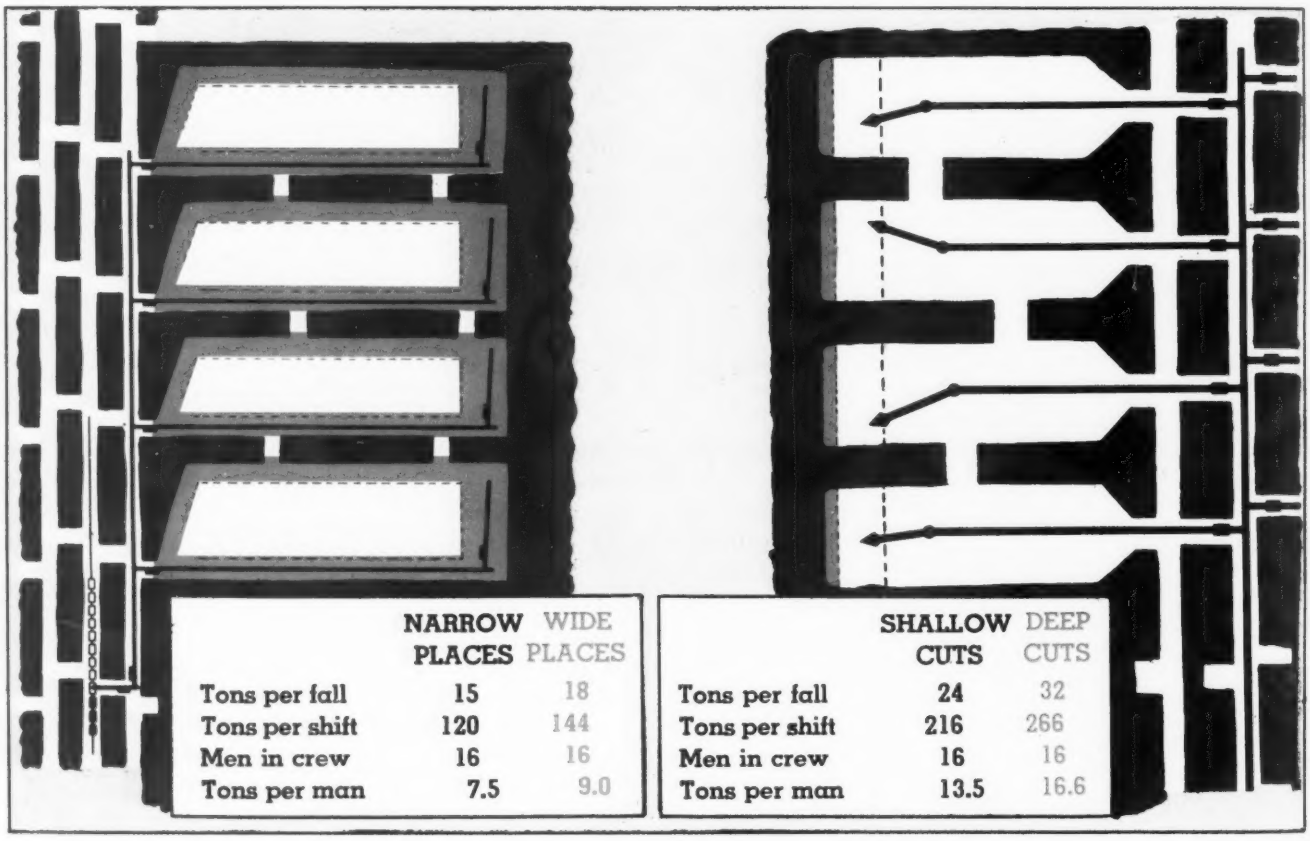


	BEFORE	AFTER
Places	45	10
Tons	220	350
Men	10	15
Tons per man	22	23.3

in a few places is lack of reserve faces and the necessity for carrying on two or more operations in a single face at times with increased chance of interference. Even if increasing the number of places should show no or little increase in output per man, more faces per territory would utilize to better advantage the productive capacity of the equipment and the money invested therein.

Operation of development units merits special attention from this standpoint. Raising the number of headings per entry to at least three and if possible four or more normally is a paying step. As in room territories, the savings possibilities in increasing number of working places is substantial.

More Tons per Fall–Lower Cost



	NARROW PLACES	WIDE PLACES
Tons per fall	15	18
Tons per shift	120	144
Men in crew	16	16
Tons per man	7.5	9.0

	SHALLOW CUTS	DEEP CUTS
Tons per fall	24	32
Tons per shift	216	266
Men in crew	16	16
Tons per man	13.5	16.6

Quantity of coal available in a working face, like quantity in a territory, is reflected in unit output particularly in output per man. When a mobile loader is traveling it can't be loading. Therefore, the goal should be maximum tonnage per fall to reduce the number of moves. The same applies to other equipment, although with conveyors and scrapers there is a little more opportunity for using the moving period for doing other necessary work. However, it is reasonable that the less often the cycle of cutting, drilling, shooting, conveyor extension, scraper moving, etc., must be performed the more opportunity there is for carrying on the major activity—loading. And the less often cutting, drilling and other operations have to be repeated, the less labor is necessary for such operations, still further improving the productivity per man and the cost picture.

Tonnage per fall may be increased two major ways:

1. Widening the place—if roof conditions, loader reach or other factors permit.

2. Making a deeper cut, which is possible in practically all cases, athough it may force the adoption of new machines if old ones cannot be rebuilt to carry longer bars. Treated or alloy bits may help an old machine handle the extra places or increase the capacity of a new one. However, most machines have the capacity to carry a longer bar or can be rebuilt to achieve that objective.

How a wider place or deeper cut might work out is shown graphically in the accompanying illustration. Investigation of the possibilities certainly is indicated when any campaign to improve mechanical-mining efficiency is undertaken.

Big Cars–Short Change–More Tonnage

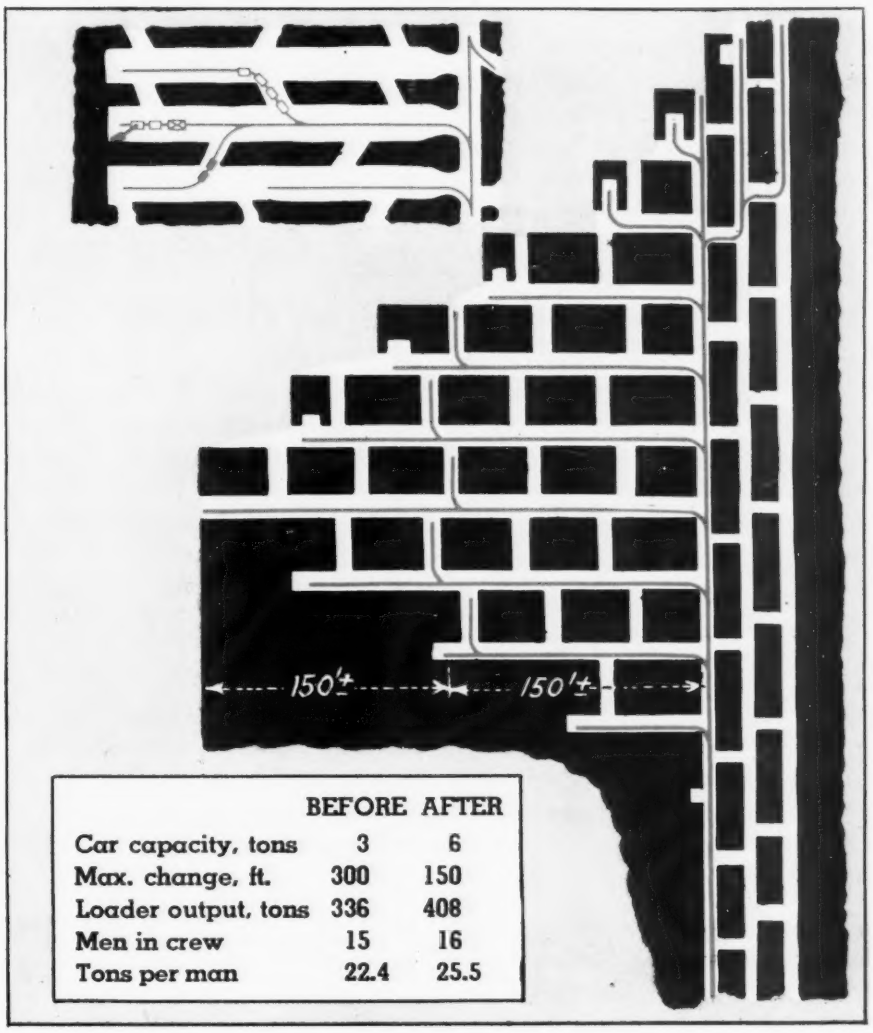
Size of car and how long it takes to remove a load and replace an empty are perhaps the most critical factors in loading-machine operation. Conveyors, because they operate continuously, theoretically are the most efficient transportation medium behind loaders. But various factors, such as moving time, the necessity for a continuous working cycle and a small number of working places if investment is to be kept down, etc., make it difficult for room conveyors behind loaders to compete with good mine-car or shuttle-car systems. However, "good" means really good, and under many conditions conveyors can be the best haulage medium.

Among some of the features of a good mine-car set-up are:

1. Big cars—biggest possible.
2. Delivery of the cars to the working section as needed.
3. A short car change.

Other refinements might be added, such as two changing locomotives where conditions permit and the extra tonnage warrants the additional cost and labor. Use of shuttle cars permits two changing units per machine even in pillar mining. And since shuttle cars normally replace much smaller mine cars, they also accomplish one of the major objectives in service to loaders. Big cars include the so-called "transfer cars" being increasingly applied at mines where shaft size forbids bringing large cars to the surface.

Two popular methods of shortening car-changing distance are the "key-room" system where pillars are left and the spur-track system where pillars are removed, both shown in the accompanying illustration. In either case, the objective is to keep the maximum change down to less than 100 or 150 ft. Thus, as compared to changing on the entry for rooms 300 ft. deep, the time required per change, assuming a locomotive speed of 300 f.p.m. (3½ m.p.h.), averages 1 minute over room life with changing on the entry and ½ minute with a changing point half way up.



	BEFORE	AFTER
Car capacity, tons	3	6
Max. change, ft.	300	150
Loader output, tons	336	408
Men in crew	15	16
Tons per man	22.4	25.5

The savings through big cars and short change are complementary and cumulative. Thus, with a loading machine having an average loading rate of 3 tons a minute, 3-ton cars and changing on the entry, time required to clean up a place making 24 tons theoretically would be 15 minutes (8 minutes loading and 7 minutes changing, assuming no change for the last car when the loader would move). Allowing for some longer loading time in cleaning up, shifting position and moving, total time per place might be 30 minutes, making the output per 7-hour shift 14 places, or a total of 336 tons.

Now, if a 6-ton car was installed and changing distance was cut in half by putting in switches half way up each place, theoretical time required to clean up a place would be 9½ minutes (8 minutes loading and 1½ minutes changing at ½ minute per change). Allowing for moving and other operations, time per place might be 24½ minutes. The saving on 14 places therefore would total 77 minutes, enough to load three additional places provided they could be prepared. Unit output therefore would be 408 tons. If the crew was 15 men in one case and 16 in the other, outputs per man would be 22.4 tons with the small car and long change and 25.5 tons with the big car and short change.

FACE PREPARATION FOR HIGH OUTPUT

GOOD face preparation is a combination of equipment, materials and methods. In equipment, capacity may or may not be the most important item, although it usually is. In conveyor service, for example, where it is desired to have a cutter in each place, reduced horsepower shortwalls are available at substantially less than standard-machine prices. Or for cutting over the coal or cutting out partings, special over- or middle-cutting machines of the shortwall type are available, in addition to the higher-capacity track, crawler or rubber-tired slabbing or universal units.

High Capacity Pays Dividends

Capacity of the cutting machine—or of the drill—in relation to labor required for its operation is no less critical than with other equipment. To save money, therefore, high output ranks first. Can capacity of existing shortwalls be increased? In many cases it can. The measures include rebuilding or modernizing to increase feed speed or accommodate a longer bar or both, or the use of special bits to reduce changing time, cut power demand and otherwise better performance.

New, improved shortwalls with modern controls and auxiliaries, including hydraulic tilting, are the answer to cutting problems in many cases. With one-third to one-half more capacity, they offer the possibility of savings sufficient to return their extra cost in two to three years—sometimes less—if used at rated capacity. The savings include not only higher productivity but also lower maintenance and less power per ton.

Where even higher capacity and a corresponding cost advantage are desired, the track, crawler or rubber-tired arcwall, slabbing or universal cutting and shearing machine is the economical bet in addition to its possibilities in shearing or cutting at various horizons, including cutting and removing partings, bands or middlemen. Growing use of such equipment is evidence of the savings.

Much the same considerations govern choice of drills—from small hand-held units where service warrants through to high-capacity multiple-spindle track, crawler or rubber-tired machines.

Choosing Bits for Low Cost

The bit is by far the most important factor in either cutting or drilling since it is through it that the power of the motor is applied to break out and remove the coal. The choice of the bit, therefore, deserves the most careful study. Steps that can be taken to improve bits include:

1. Tipping with a hard-surfacing material.
2. Heat-treating.
3. Use of special alloy bits, including multiple-point types.

The results are reflected in the following:

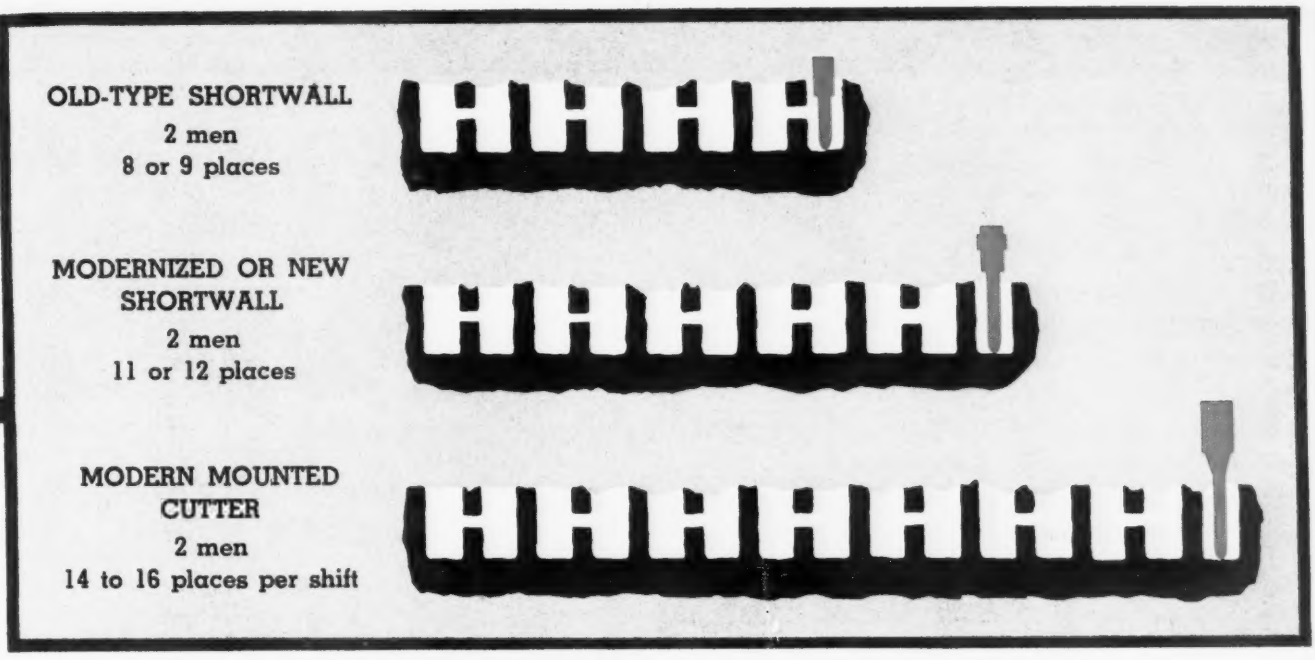
1. Less or no transportation.
2. Less or no sharpening labor.
3. Production of two to six times the coal between bit changes, with consequent increase in time available for cutting and moving.
4. Reduced power demand and energy consumption or more production with the same demand and energy.
5. Lower machine maintenance.
6. Higher percentage of coarse

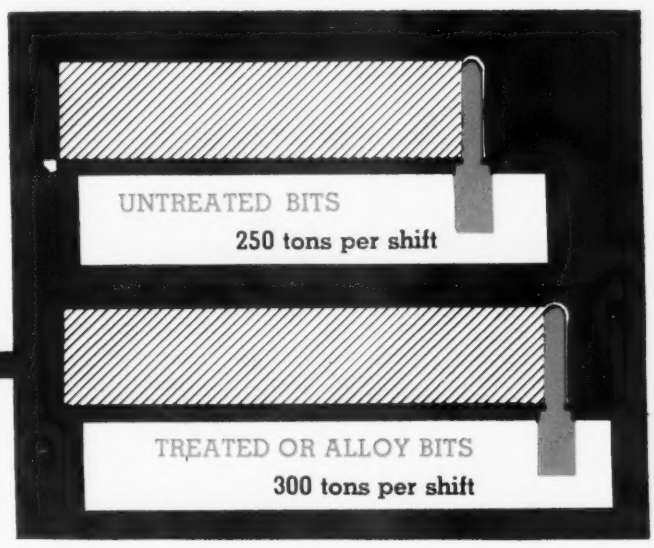
Low-Cost Coal Breaking

How coal is cut, drilled and shot, including choice of the breaking medium, influences not only cost of face preparation but also the efficiency of the loading operation. In other words, good shooting not only is cheaper but it increases "loadability," or the ease with which the coal can be picked up by the loading machine or hand loader in conveyor work. In addition, proper choice of medium and method permits a substantial increase in the proportion of coarse sizes.

Straight ribs and an even bottom are critical factors in cutting. Cleaning the kerf, or bugdusting, is a vital auxiliary operation in that it materially increases the efficiency of the breaking operation. Shearing is being increasingly adopted where it is desired to increase loadability, reduce powder consumption and improve the yield of coarse sizes.

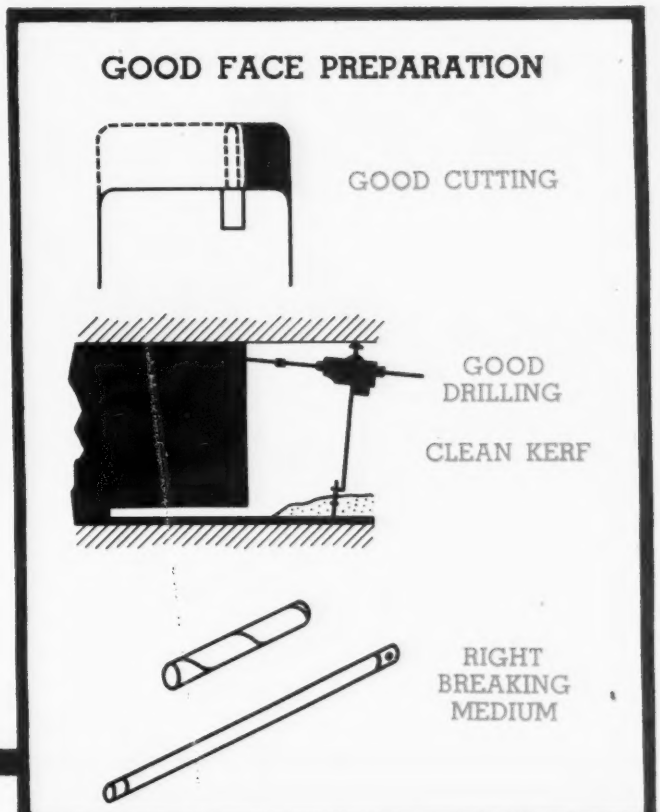
The drilling pattern is worthy of the most intense study. Holes should never be drilled on the solid and the pattern should provide an equal burden on each





sizes in the cuttings production.

To take only Points 3 and 4, experience has shown increases of up to 20 percent or more in tonnage per shift through better bits.



	Poor face preparation	Good face preparation
Loader output, tons	350	380
Cost of explosives and detonators	8c.	4c.
OR		
Loader output, tons	350	380
Increase in plus 1¼-in. coal or other combinations of benefits		10%

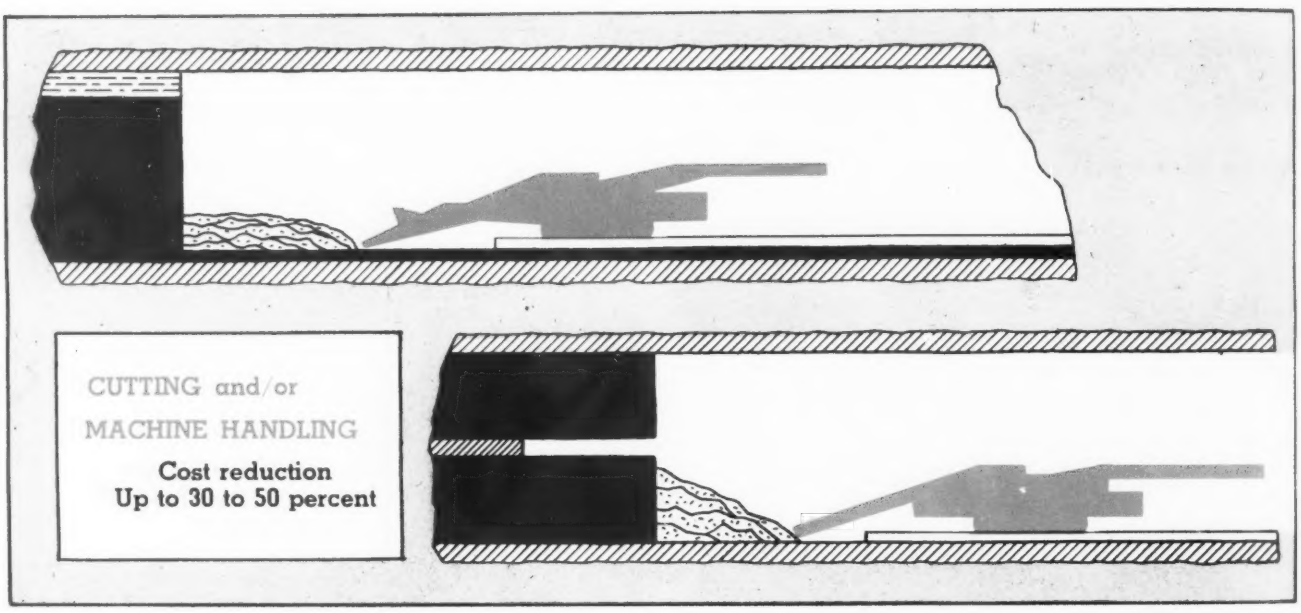
hole, with each one in turn relieving the next in sequence. By studying hole patterns, it may be possible to do the job with fewer drill set-ups and a corresponding saving in drilling labor.

Modern breaking mediums include permissible explosives, carbon dioxide, air and hydraulic pressure. Some provide substantially higher coarse-coal yields

and some are especially adaptable to deep cuts in thin coal. Whatever the objective, the operator now can find a breaking medium that will make it possible of attainment at low cost. "Cushion shooting" is an additional step that may be taken where coarse coal and other advantages are desired. Proper stemming is vital with all explosives.

What can be accomplished by good face preparation and shooting? One thing at a number of properties is a 50 percent reduction in cost of explosive and detonators and a 10 percent or greater increase in loader output, plus a good gain in coarse-coal yield—often as high as 10 percent or more.

Low-Cost Impurity Handling



Handling partings or drawslate lends itself to mechanical methods as well as other mining operations. For example, if loading coal mechanically can reduce labor cost 25 or 30c. per ton, or more, handling heavy partings or drawslate the same way should result in similar savings.

Methods of handling drawslate include:

1. Holding the slate temporarily by jacks at the front or forepoling until the coal can be loaded (where equipment has a reach sufficient so that men need not go back under the slate), then dropping or shooting it and loading or gobbing it mechanically.

2. Even better, where possible, cutting out or cutting and raking slate, then handling cuttings mechanically. Special machines fitted with conveyors for gobbing or loading permit doing the job at one crack.

Where arcwall, universal or slabbing machines are installed, partings or middlemen can be handled in several ways, including the following:

1. Cutting them out when thin.

2. Cutting once or twice and then raking when thick and handling mechanically.

3. Cutting under, shooting down, pulling out and handling mechanically.

4. Cutting under, shooting and loading bottom bench, dropping or shooting parting and handling mechanically to clear top bench.

5. Cutting over, where loader with high-lift head is available, shooting and loading top bench, ripping off parting with loader (with or without shooting, as conditions dictate) and gobbing or loading it, shooting and loading bottom bench.

Where undercutting is the practice, the opportunities for handling partings are limited largely to one and perhaps two. The best probably is shooting the bottom bench and loading it, then dropping the parting and handling it mechanically, following this by shooting and loading the top bench.

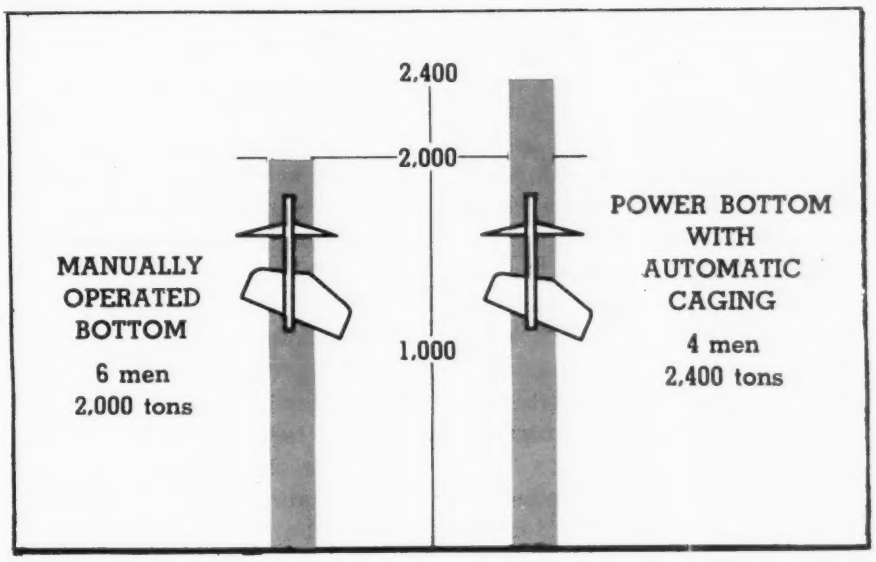
Another alternative to all these methods for handling both drawslate and partings, which has been adopted at a few operations, is to shoot and load everything, removing the rock in a surface cleaning plant. Depending upon conditions, it may be the cheapest, although, while saving labor and time, it also requires additional investment in loading, transportation and preparation equipment and in refuse-disposal facilities.

CUTTING TRANSPORTATION COST

UNDERGROUND transportation at coal mines is a materials-handling job and, like other materials-handling jobs, the more it is mechanized with efficient, high-capacity labor-conserving equipment, supplemented by modern operating methods, the lower the cost. Increases of 20 percent or more in capacity of the transportation system with proportionate or even greater reductions in cost have been achieved at many operations by the use of modern equipment and methods.

Getting More for Less in Hoisting

Opportunity for improvements in transportation functions and conservation of labor exist in many forms, such as modernization of a mine-car haulage system or the substitution of belt transportation for part or all of the mine-car haul. Or, to turn to another operation, cars can be handled on a shaft bottom by hand. Or power-operated car feeders and trip makers in conjunction with automatic cagers may be installed.



The possible savings in mechanization of shaft-bottom operations are substantial, not only in speeding hoisting by reducing delays in moving cars and caging but in men necessary in bottom operation. If six men were required for manual bottom operation, and installation of feeders, trip makers and automatic cagers made it possible to operate with four, the annual saving on the basis of 200 days of operation could be approximately $3,000, in addition to other benefits. At that rate, substantial investments would be warranted with the assurance that cost would be returned in a relatively short time.

For maximum efficiency in manpower, equipment and power, skips or slope belts may be resorted to in hoisting with benefits as summarized in the preceding material in this issue. But, as stated, the advantage of the skip over the cage hoist grows less as car size increases, and if physical dimensions do not interpose too rigid limitations, the problem of using a bigger car in the same shaft may be solved in part by adopting an improved design of cage. Lightweight high-strength steels and other alloys can reduce the weight of a cage 20 or 25 percent, enabling it to handle that much more car and coal with little change in the characteristics of the hoisting problem.

Low-Cost Cars and Locomotives

Mine-car and locomotive equipment, especially the former, has a major bearing not only on the efficiency of face operations but on transportation efficiency and cost as well. With modern track, shortest possible hauls and grade reduction or elimination, modern cars and locomotives can cut transportation cost 25 to 50 percent through reductions in equipment cost, labor, power and maintenance. Big, modern cars alone, as pointed out elsewhere in this issue, can save 10c. a ton or more in haulage cost and improvement in face operations.

What are some of the characteristics of modern locomotives? For gathering units they include:

1. Ample weight and power for the job.

2. Modern positive-acting reel equipment.

3. Ability to reverse direction rapidly. Many new gathering locomotives for mechanical-mining service are equipped for stopping and reversing by plugging.

4. Fast, positive brake equip-

ment where other controls are not provided or for use in conjunction with such controls. Thus, new machines are being equipped with lever-type mechanical brakes or hydraulic equipment for faster, smoother operation and lower maintenance.

5. Good accommodations for motorman *and* triprider.

6. Low-maintenance features — anti-friction armature and journal bearings, totally inclosed axle bearings, provisions for cutting one motor out of circuit in case of trouble, heavy frames, heat-treated gears, alloy axles, continuous strip or punched-plate resistors, modern controls, definite overload protection, modern sanding equipment, heat- and oil-resisting wiring, Class B insulation, shoe-type current collectors, good spring and equalizer equipment, and other similar items.

Slow speed is another feature worthy of serious consideration when choosing a gathering locomotive. Tests as far back as 1924 of 3.5- and 6.9-m.p.h. 8-ton reel-type gathering locomotives showed that the gathering output of the slow-speed machine was 334.5 tons per shift at an average of 0.2135 kw.-hr. per ton against 326 tons at 0.3465 kw.-hr. for the high-speed unit. The power saving with the slow-speed machine therefore was 37.5 percent.

Battery locomotives, especially for gathering, have not had the attention in recent years which their many advantages warrant. A number of operations, even where the bottom is highly irregular, have found battery gathering the cheapest in the long run, and batteries certainly have demonstrated their capabilities in shuttle cars. Their slow speed — an advantage in most cases — and elimination of reels and cables and their accompanying troubles, and part of the bonding that otherwise is necessary for most efficient use of power and economical low-maintenance operation, are among the advantages of the battery unit. The longer life and higher capacity now being built into modern batteries make their use even more worthy of investigation.

The characteristics of modern trolley locomotives for main-line and secondary work, in addition to those listed also for gathering locomotives, include: ample motor horsepower per ton of weight, plus blowers for the motors; contactor controls; air or hydraulic brakes and dynamic braking; air sanding; good strong covers, etc.

Capacity is the major hallmark of the modern mine car. As pointed out previously in this issue, the bigger the car the better the performance of the mechanical-mining unit. Where seam height permits, cars holding 10 tons or more already are in operation and there is good reason to believe that even these will be eclipsed by a substantial margin in the future. But size is not the only feature of the modern car. Others include:

1. High-strength corrosion-resisting alloys to reduce weight 20 to 30 percent, lengthen the life and reduce maintenance.

2. High-strength alloy axles, hitchings, pins and other accessories.

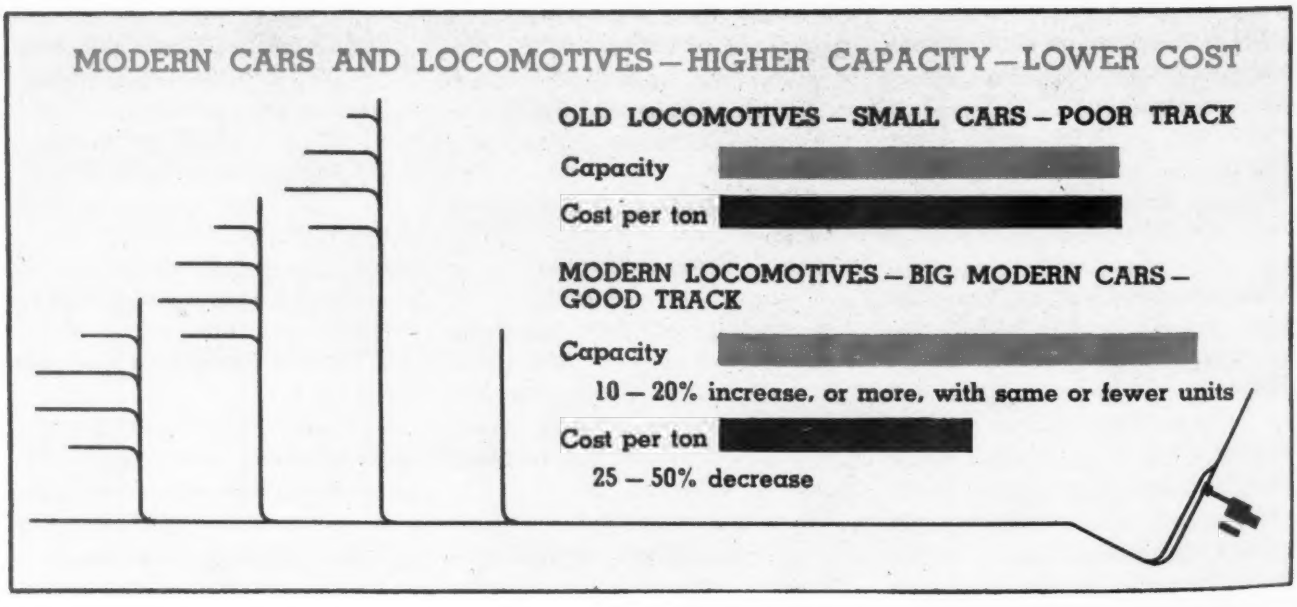
3. High-strength, long-lived wheels.

4. Anti-friction bearings for better haulage performance and lower maintenance. A major advantage of such bearings lies in the fact that they offer half or less the resistance of the plain bearing to movement.

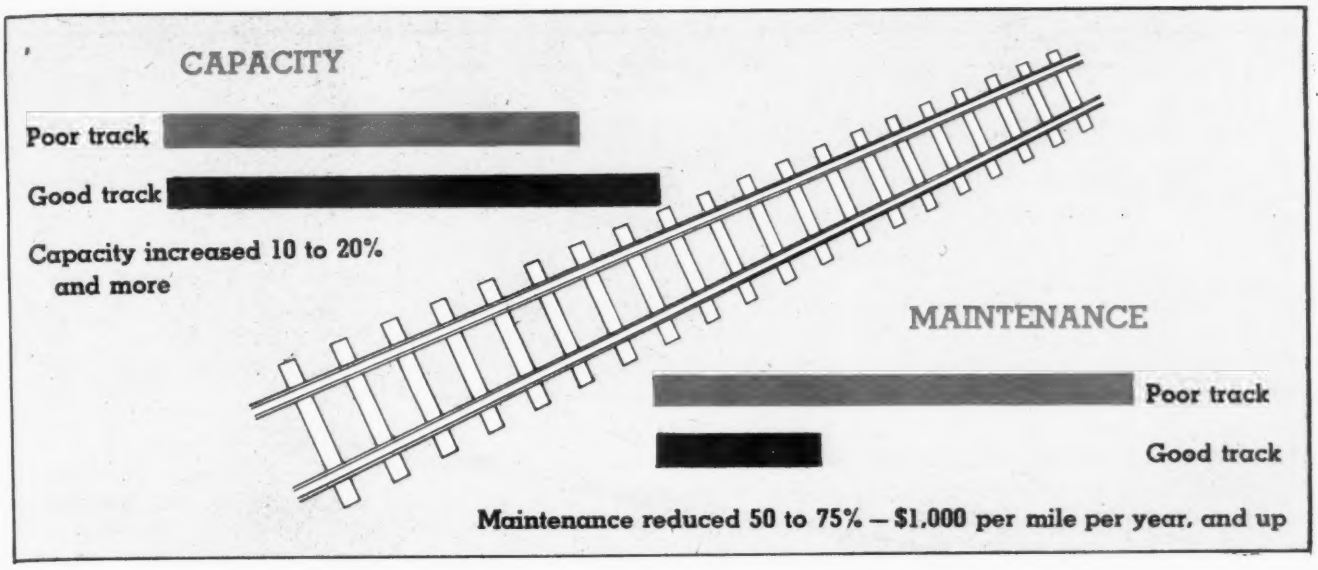
5. Spring, rubber or other suspension.

6. Spring, rubber or other draft and buffing gear.

7. Automatic couplers, which save time and labor and promote safety.


MODERN CARS AND LOCOMOTIVES — HIGHER CAPACITY — LOWER COST
OLD LOCOMOTIVES — SMALL CARS — POOR TRACK
Capacity
Cost per ton
MODERN LOCOMOTIVES — BIG MODERN CARS — GOOD TRACK
Capacity
10 — 20% increase, or more, with same or fewer units
Cost per ton
25 — 50% decrease

Low-Cost Haulage Roads



Good roadbed, good drainage, good track and good roof support insure haulage roads providing maximum transportation efficiency with minimum power consumption and maintenance. When combined with grade elimination, these and other conditions guarantee maximum benefits from the use of modern rolling stock.

Good track in coal mines starts with drainage. Water should be kept off haulageways, or if it occurs in them it should be led away at the first possible opportunity by ditches, culverts or other means. Subgrade materials and standards are susceptible of some variation, but the subgrade should be adequate for the traffic.

Rail weight is a major factor in the final operation of mine transportation. A basic mistake is using too light a weight. On main lines, 60-lb. is none too heavy and some mines have found 80-, 90- or more a paying investment. Weight of rail on secondary haulage routes should be 50 lb. or more, and in room entries and rooms where heavy equipment is employed, not less than 40.

The joint is a critical item, from the standpoint of strength, maintenance and ability to act as an electrical return. Welding is finding more and more adherents where permanent track is concerned. Studies have indicated that with even the most expensive welded joint, the cost over the life of the track is several dollars less than the usual angle-bar-and-bond joint. When the savings per joint are applied to several miles of track, they reach a sizable figure. In addition, users of welded joints report substantially smoother operation and sharply reduced derailments.

One of the major opportunities for saving in track construction is in ties, especially on main lines, where wood normally is employed. Treating ties to retard rot normally lengthens their life at least three times compared to installation without treatment. Thus, while the cost of a treated tie might be double or more that of the untreated, at least two renewals are saved. And since the cost of taking out a rotted tie and replacing it with a new one can run $2 or more in labor (somewhat less in quantity), the net saving in two renewals in, say 10 years, may be $5, sometimes more, sometimes slightly less, or approximately $10,000 more or less per mile of track. The figures, as intimated, might vary some either way, but in any event the possible saving is substantial, not only in replacement cost but in maintenance of good track condition over a much longer time.

Long-radius curves, proper superelevation and the use of modern turnout and crossover equipment round out "par" track. But the job of making a haulageway deliver 10 to 20 percent more is not complete without proper roof support. The necessity for good roof support comes into better focus when delays due to falls are brought into the proper perspective. If bad roof should result in delays totaling seven hours a month, the reduction in mine capacity would be 4 to 7 percent, depending upon the number of days worked.

With proper roof support, it is possible to reduce delays from roof falls to practically nothing. The materials available include wood and steel timbering, concrete and gunite. If wood is employed, treatment is indicated for exactly the same reasons as with ties. Where possible, with any kind of timbering, it is helpful if the use of legs can be eliminated. Hitch-drill timbering, which normally is faster and cheaper in labor, therefore is worth serious consideration, along with guniting for permanence and entries free of obstructions.

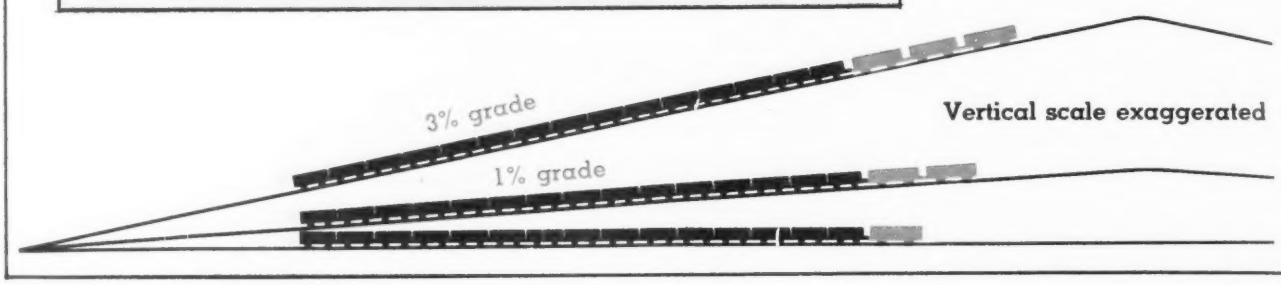
SAVING BY CUTTING DOWN HUMP

1 or 2 locomotives **1 to 4 men**

Up to 50% or more in power on grades

Lower power peak

Cost of Cutting Down Hump: **less than cost of equipment that otherwise would have to be bought**



Low Cost Through Grade Reduction

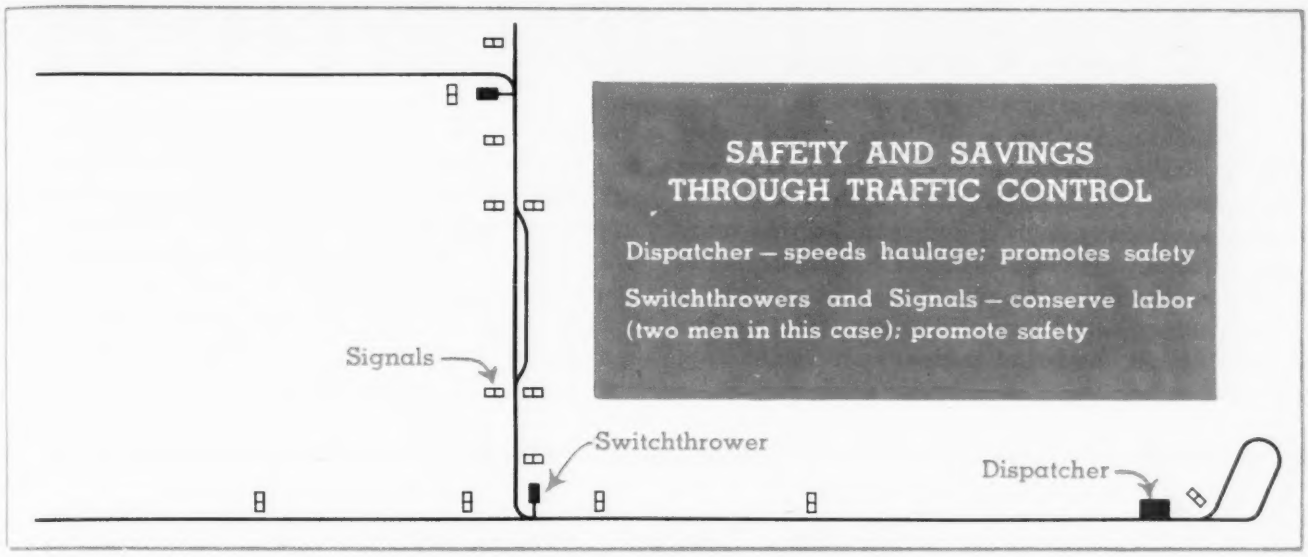
Under normal conditions, it is almost axiomatic that it is cheaper to cut down a grade rather than haul over it. In some cases, however, operators have found that, paradoxically, it is better to haul the long way around and get the advantage of a favorable grade for the loads. Normally, however, the short route is the cheapest, even if it requires special construction (such as a new route through old workings) or heavy grade elimination, since time is a factor and an undue increase in haulage distance would require additional equipment.

Some idea of what grade reduction can accomplish is shown in the accompanying illustration. As compared with hauling over a level track with one locomotive, three of the same size or one or two larger units would be required. Even 1 percent normally halves the size of trip that can be handled. If, in this particular installation it cost $15,000 to eliminate the hump, the saving would be returned and perhaps more, in investment in additional locomotive equipment, not to mention labor, power and maintenance. In power alone, pulling over a heavy grade can increase energy consumption as much as 50 percent.

Low Cost Through Haulage Control

A modern coal-mine transportation system naturally cannot function at its best—especially if a number of units are involved—without some form of centralized control plus the necessary telephone, signal and switch-throwing equipment. Thus, to insure getting cars to the points where they are needed when they are needed and to eliminate time-wasting interference while promoting safety, dispatchers are employed at many mines. Normally, these dispatchers work through telephones at strategic locations, although it is possible for them to exert control over such functions as letting one or another locomotive onto a main line by means of light signals. And where two or more locomotives are operating over or entering one stretch of track, block signals operating independently of the dispatcher prevent collisions, unnecessary stops and other interference with movement of trips.

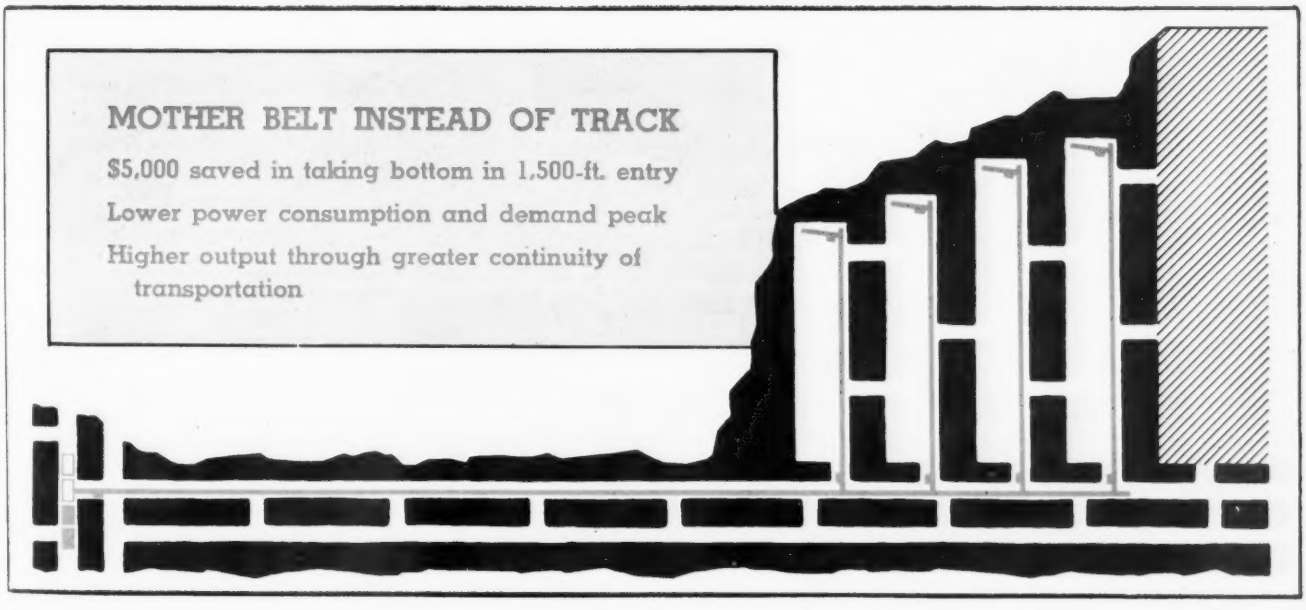
A substantial increase in the capacity of the transportation system through better organization and conduct of operations results from modern controls, in addition to saving labor, power and maintenance. Even a simple switch-position indicator may save in all these departments by making it unnecessary to slow down or stop a trip to determine which way a switch is aligned. Thus it is necessary to stop only when the switch must be thrown. Some authorities have estimated that it takes two minutes to stop a trip and throw a switch, plus an extra 240-amp. power peak (85-ton gross weight


SAFETY AND SAVINGS
THROUGH TRAFFIC CONTROL
Dispatcher – speeds haulage; promotes safety
Switchthrowers and Signals – conserve labor (two men in this case); promote safety
Signals
Switchthrower
Dispatcher

trip with 10-ton locomotive), making the total cost per stop 8c. In the same time, the trip could have been 1,400 ft. farther on its way.

The problem also can be approached another way. If, to prevent stopping trips, a switchman was employed full time, his wages for a year might be $1,200. On this basis, purchase of an electric switchthrower would pay off in a very short time. Much the same principle governs the installation of block signals and other equipment for speeding up haulage.

Low Cost Through Conveyors


MOTHER BELT INSTEAD OF TRACK
$5,000 saved in taking bottom in 1,500-ft. entry
Lower power consumption and demand peak
Higher output through greater continuity of transportation

The conveyor, as stated previously in this issue, theoretically is the best transportation medium where pitch or distance is not too great. One of the best fields of application of the belt type, aside from slope service, is in room-entry transportation, especially in lower coal. To the advantages of continuity of operation and relatively lower power demand and consumption is added the elimination of top brushing or bottom lifting that otherwise would be necessary to admit cars.

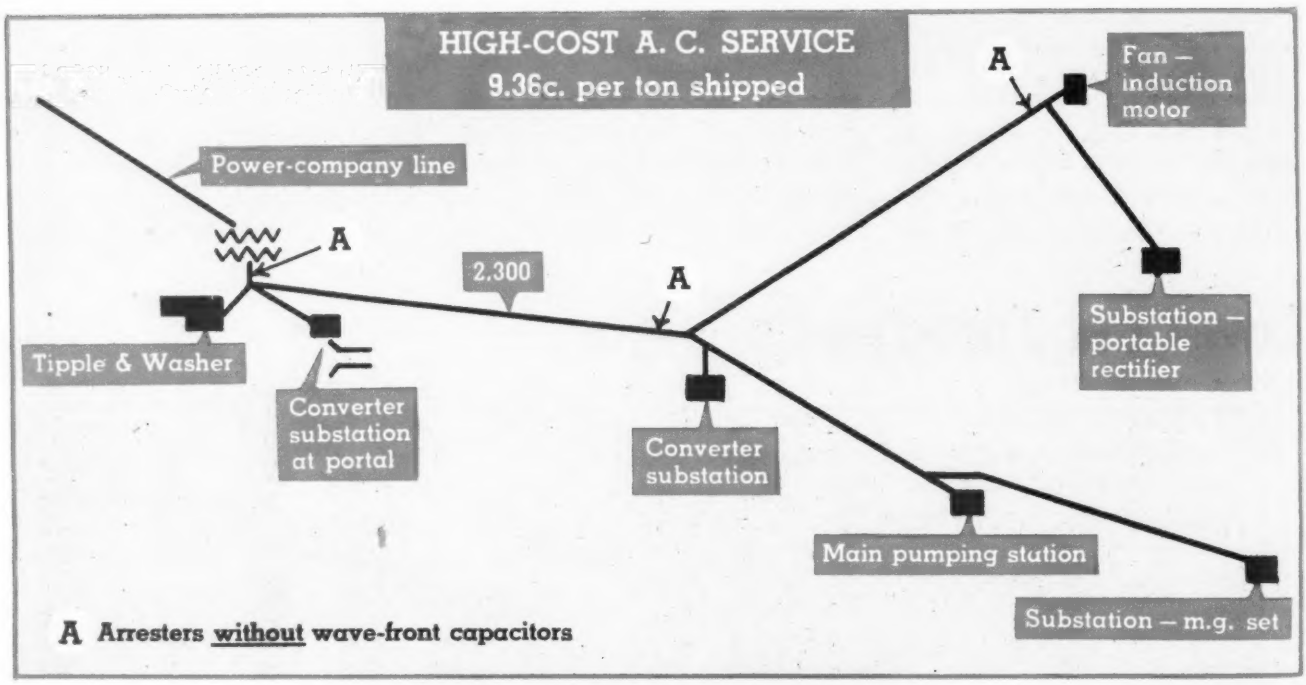
Taking 18 in. of material in an entry 12 to 14 ft. wide, even when done in the cheapest possible manner, seldom could be done for less than approximately $1 per foot of entry and easily could reach $5 or more. In an entry 1,500 ft. long, therefore, the cost of getting height for mine cars might be as low as $1,500—no small sum in itself—and as high as $7,500, aside from the cost of gobbing the material, if possible, or hauling it outside and disposing of it there. When the cost of track construction is added, such sums make the mother belt an attractive alternative.

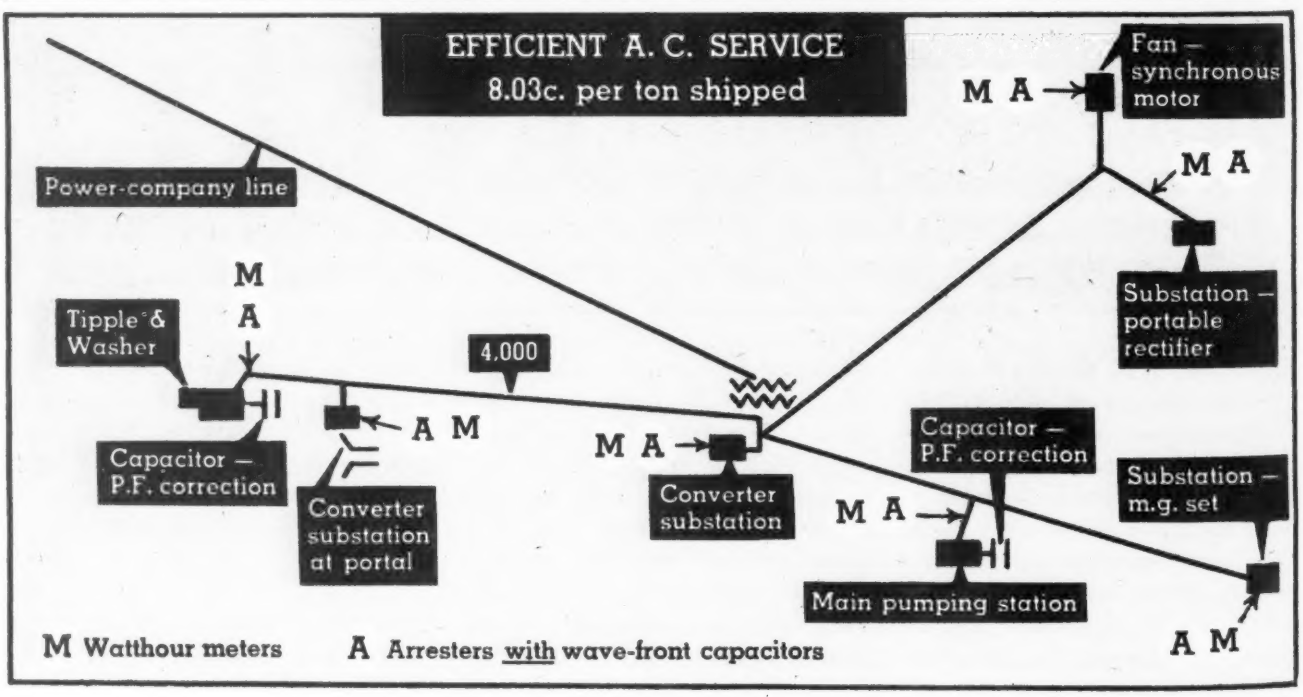
POWER FOR LOW-COST OPERATION

MECHANICAL mining necessitates good power. Since good power is largely independent of natural conditions, making it good and thus insuring maximum efficiency at lowest cost, is largely a matter of engineering management.

Low voltage and interruptions affect cost and efficiency from a number of angles:

1. Production drops as a result of slower operation of equipment and more service interruptions.
2. Men working with bad power are not inclined to put forth their best efforts.
3. Breakdowns from overheated motors and auxiliary equipment cut output.
4. Maintenance costs are increased.
5. Power cost is increased through waste of energy and prolonged demands.





Few and fairly simple measures will insure the maintenance of effective, economical voltage at the points where the work is done. Putting substations, whether transformer or d.c. conversion, at load centers is the first step. Making them portable as far as possible helps insure that the stations are kept at these centers. Establishing voltage standards and checking regularly with meter equipment as necessary, supplemented by records of energy distribution, insure maintenance of the proper voltage and prevent waste. Using ample conductor capacity and keeping circuits in A-1 condition is a third major step. Protective, sectionalizing and distribution aids round out an efficient, low-cost mine power system.

What can be expected of a good power system as compared to a poor one? The following examples provide an indication. While the savings through higher productivity, decreased energy consumption and lower demand will vary from property to property, it is wholly within the realm of possibility that they will be substantially higher than those shown. But a 10-percent increase in output per man with a corresponding reduction in demand and energy consumption certainly is within the reach of most operations not now using modern facilities. In many cases the results can be even more attractive.

Modern A.C. Service--Lower Cost

HIGH-COST SYSTEM	EFFICIENT SYSTEM
Main transformer substation too far from load center.	Main transformer substation at or near load center — with suitable taps.
2,300-volt distribution (three-wire).	4,000-volt distribution — four-wire, including grounded neutral.
4/0 pole wires and 1/0 underground cables — both too small for distances and loads at 2,300 volts.	4/0 pole-line wires and 1/0 underground cables — ample capacity to carry the loads over the short distances at 4,000 volts.
No capacitors for power-factor correction on property.	Capacitors for power-factor correction in tipple and main pumping station.
Induction fan motor.	Synchronous fan motor.
No watt-hour meters.	Watt-hour meters at principal distribution points to check power use in various sections or for various loads and provide a rough check on power-company meters.
Too few lightning arresters and these without wave-front capacitors.	Sets of arresters at transformers, for principal loads and at line junction points, each set with small capacitors to reduce steepness of wave front.
No ground-detection equipment.	Complete ground-detector equipment for safety and low maintenance.
RESULTS	*RESULTS*
9.36c. power cost per ton of coal shipped.	8.03c. power cost per ton of coal shipped.
7.8 kw.-hr. per ton. 980-kw. demand.	7.3 kw.-hr. per ton. 929-kw. demand
Frequent lightning interruptions and m.g. substation outages due to low voltages at peak loads.	Few lightning interruptions and no substation outages due to voltage drops.
6.3 tons per man-shift (all men inside and outside).	6.7 tons per man-shift.

Modern D. C. Service--Lower Cost

GOOD POWER CUTS COSTS

371 tons per loading unit, against 263
24.1 tons per man, against 16.4
4.65c. per ton d.c. power cost, against 7.45c.

LESS-EFFICIENT SYSTEM

Substation (275-volt stationary), 3,500 ft. from working faces

4/0 trolley wire; one 500,000-cir.mil feeder on main and flat entries.

Haulage and face equipment on same circuit.

Cross bonds lacking on mains and flats; bonding poorly maintained, often not completed on room entries.

No auxiliary return.

No sectionalizing breakers.

No portable meters for checking voltage and load.

M.g. substations on main line lack load distributors.

Trailing cables too small; all splicing done in rooms.

RESULTS

263 tons per unit; 16.4 tons per man-shift in the section.

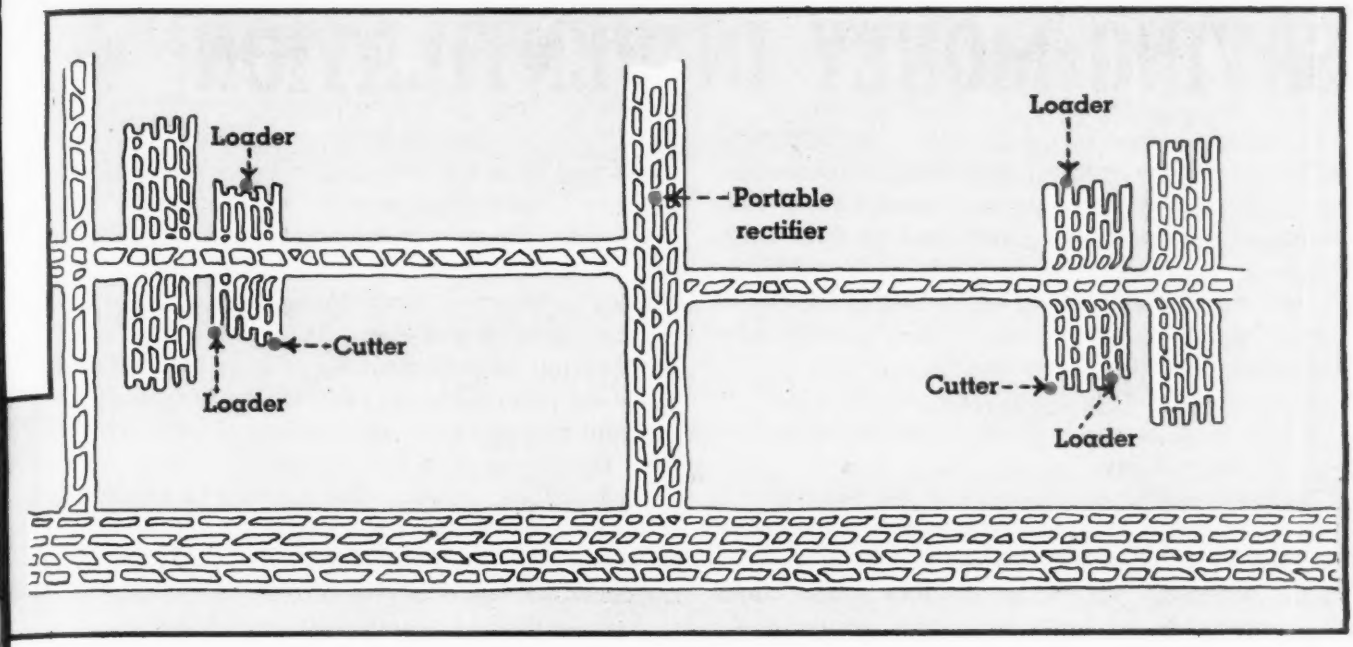
16c. per ton maintenance cost for cutters, drills, loading machines and locomotives.

7.45c. per ton for d.c. power.

4.9 d.c. kw.-hr. per ton.

Voltage drops at face sufficient to slow machines and dim lights; "no power" a frequent cause of delays.

Two fatal, 8 non-fatal electrical accidents per 1,000,000 tons.



MODERN SYSTEM

Substation (275-volt portable rectifier) installed within 1,000 ft. of working places.

350,000-cir.mil trolley wire; one 500,000-cir.mil feeder on main and flat entries.

500,000-cir.mil feeder separate from trolley from substation to last room neck to handle face load.

Cross bonds every 300 ft. on main and flat entries; wedge-type or other recoverable bonds in room entries.

500,000-cir.mil auxiliary return in parallel with tracks to last room neck.

Automatic reclosing breakers sectionalize entire d.c. system; trolley wires and feeders sectionalized every 1,000 ft. by safety switches.

Maintenance and checking equipment includes portable voltmeters and ammeters, both indicating and graphic types.

Load distributors installed on m.g. substations.

Trailing cables of approved size changed periodically for permanent splicing and vulcanizing.

RESULTS

371 tons per unit; 24.1 tons per man-shift in the section.

8.3c. per ton maintenance cost for cutters, drills, loading machines and locomotives.

4.65c. per ton for d.c. power.

3.1 d.c. kw.-hr. per ton.

Voltage at face always above 230 and interruptions infrequent; machines work normally; better morale.

No fatal, 3 non-fatal electrical accidents per 1,000,000 tons.

SAVING MONEY IN VENTILATION

AIR is one of the costliest ingredients in production at many coal mines, relatively speaking. In other words, many operations spend two or three times the money actually necessary for good ventilation, the extra cost often running into thousands of dollars annually. All this grows out of the operation of a few basic principles, including:

1. Quantity varies directly as the velocity.
2. Pressure, or water gage, varies as the square of the velocity.
3. Power varies as the cube of the velocity.

Thus, if avoidable conditions make it necessary to double quantity and velocity to insure delivery of the necessary volume at the face, other conditions remaining the same, power for ventilation increases eight times. If the average rate per kilowatt-hour is 1.5c., the annual cost of an extra horsepower would be $98 on the basis of continuous operation; 10 hp. extra, $980; 20 hp., $1,960; 30 hp., $2,940, etc. Good ventilation, therefore, is definitely a money-saver. Many operations have cut ventilating cost one-half to two-thirds by proper thought and the use of modern equipment and methods.

The mine itself establishes the characteristics of the ventilating problem and this factor always must govern design, although it is possible to change the characteristics by shortening the air travel, decreasing resistance, providing ample airway area, proper splitting, eliminating leakage, sealing worked-out areas and other steps tending to improve ventilating efficiency and reduce power.

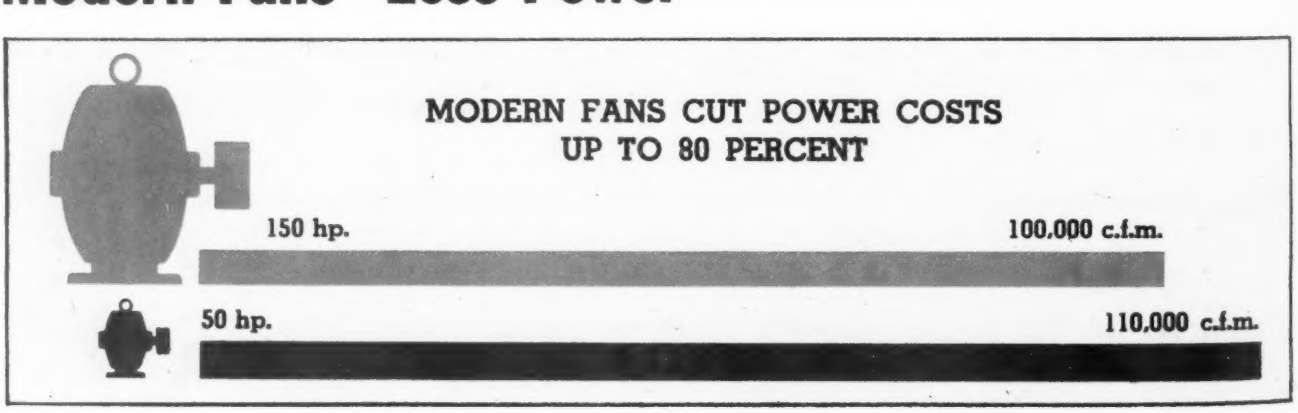
In many cases, methane production governs the quantity of air necessary and in such cases any reduction in the rate of emission will decrease the load on the ventilating system. Taking the coal clean and leaving as little standing in pillars as possible, or, where practicable, degasifying by boreholes and vacuum pumps on the surface are some steps that may be taken.

Modern fans, with no other changes in conditions, in themselves can save substantial sums of money, as experience at many mines has shown. When combined with other improvements, the possible savings are multiplied several-fold.

But the most modern ventilating system fails if the air does not get to the working face. Consequently, this final link in the chain deserves the lion's share of the attention. Some positive means of conducting air from the room neck to the face, such as a brattice line or properly installed tubing blowers, therefore is worth serious consideration in the absence of compelling reasons to the contrary.

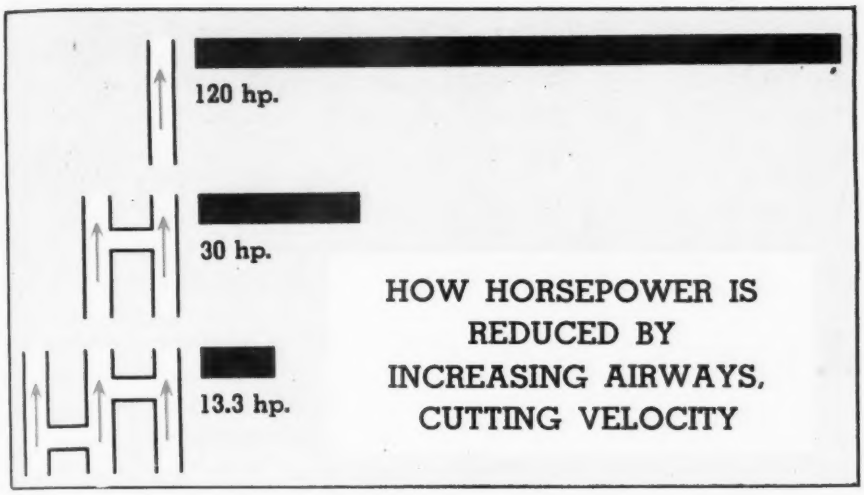
Measures for improving ventilating efficiency and reducing cost are to a considerable extent interrelated and interdependent. Thus, changing one condition usually forces changes in others. With that fact in mind, some measures which can assure good ventilation are sketched in the following material.

Modern Fans—Less Power



Late-type fans, with few or no changes in mine conditions, often can cut power materially, partly because of the inherently higher efficiency of the new units and partly because of a closer match to mine characteristics and a greater adaptability to varying conditions. Reductions of 50 to 75 percent in horsepower with the same or increased volume have been achieved at numerous mines in late years. In one case, replacement of an old-style unit at the top of a shaft with a modern fan on the bottom cut connected horsepower from 300 (235-kw. demand) to 75 hp. (58.5-kw. demand). The old fan furnished 118,000 c.f.m. at a water gage of 4.55 in. The new one was adjusted to deliver 100,000 c.f.m., all the air necessary, at a water gage of 3.55 in. Power savings were $1,270 per month.

Ample Airways–Low Cost



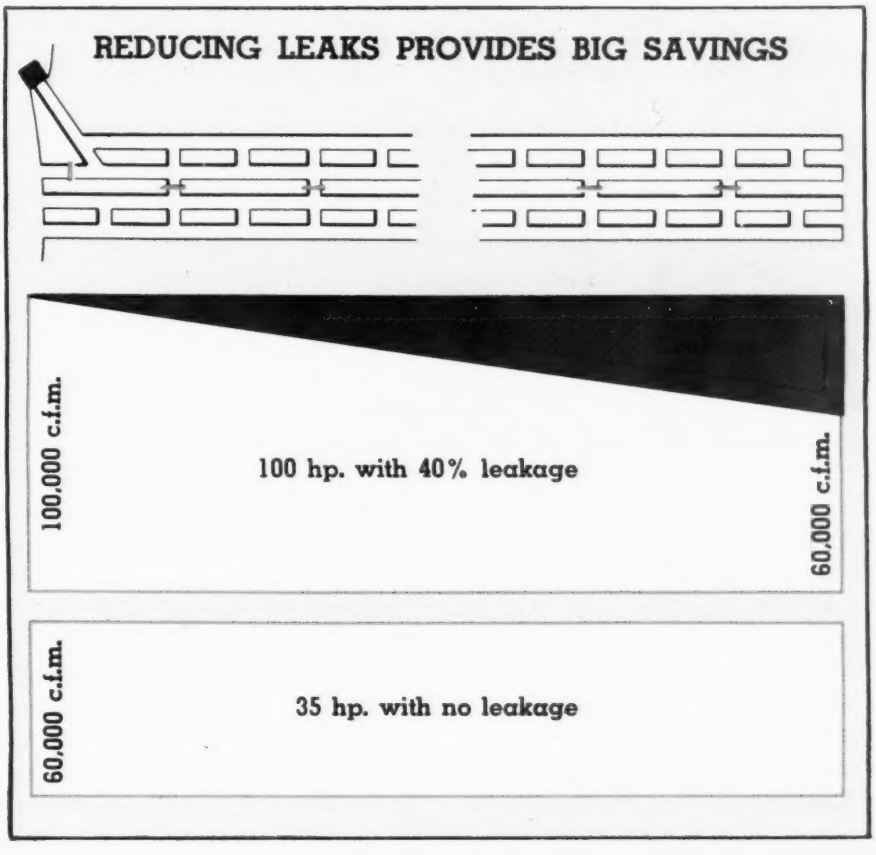
For the same quantity, increasing airway area decreases velocity proportionately and power in an even higher ratio, according to the governing formula. Thus, with two headings, the same air can be circulated with approximately one-quarter the horsepower; three headings, one-ninth. The same principle applies in keeping airways clean, free of obstructions and as smooth and straight as possible. One bad 90-deg. turn, for example, can offer as much resistance as 250 ft. of straight entry. If turns are necessary, they should be curved and of as long a radius as possible. Curved guide vanes at the tops and bottoms of shafts or in short turns are a real benefit. Sloping off the edges of falls and approaches to overcasts works to the same end—prevention of turbulence and reduction in power waste.

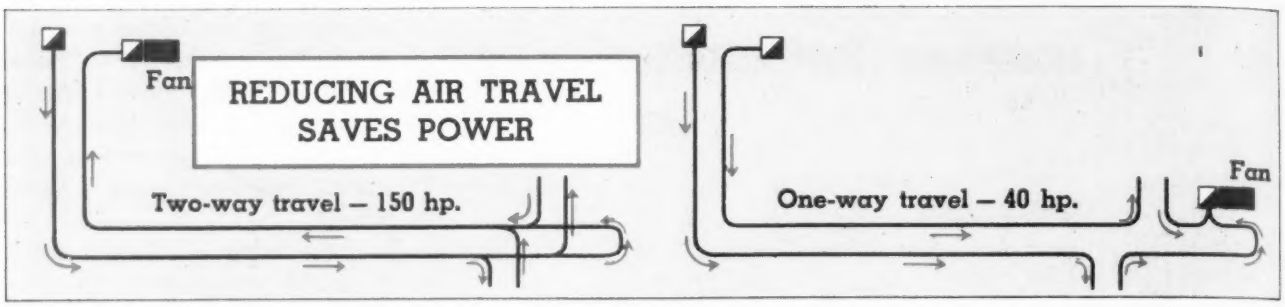
If one-third or one-half the airway area is lost through falls or other obstructions, the velocity is raised accordingly and the horsepower increased according to the square law for the same quantity. Considerable cleaning up can be done for $2,000, $3,000, $5,000 or $10,000 a year that otherwise would have to be spend for extra power. It should be noted, however, that cleaning up a regulated split is a waste of money as long as regulation is necessary. Also, other things being equal, sections having the highest velocity should have the first attention in a ventilation-improvement program.

Less Leakage–Less Power

Cases where air reaching the working places is only 10 percent of that put into the mine are not unknown and 30 percent or so is not uncommon. Leakage accounts for the rest—and for a big waste of power. Where the leakage is 40 percent, the power loss is approximately 66 percent. In other words, if there was no leakage, the required smaller volume could be circulated with approximately 34 percent of the power required to circulate the larger volume with leakage.

The same conclusions also can be reached by considering figures offered on leakage through various types of stoppings. For good concrete-block construction, the leakage is placed by some authorities at 6 c.f.m. per stopping, whereas the loss per rough-board stopping is 340 c.f.m. Loss per door is put at 3,000 to 4,000 c.f.m.—a powerful argument for overcasts.



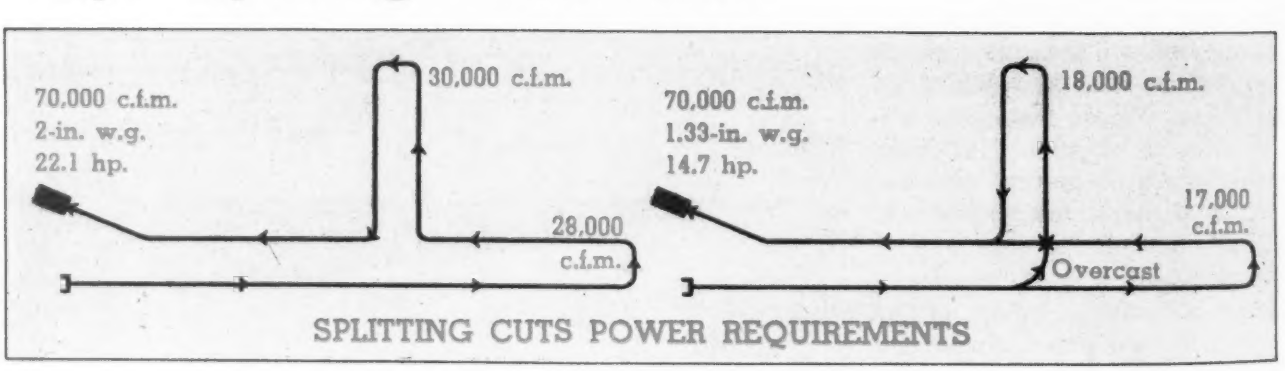


One-Way Travel–Lower Cost

Forcing air to return to the point where it was put into the mine increases the distance materially, sometimes up to practically double what it would be for one-way travel. Putting a new opening back on the property is a big money saver. Savings of as high as 80 percent in power have been achieved at some operations and 50 percent is a relatively common figure. These savings, in existing operations, arise out of elimination of leakage by eliminating a substantial portion of the usual return, doubling the number of airways for a good portion of the circuit with consequent reduction in velocity, and, of course, cutting the distance the air has to travel. As an example, one property a few years ago installed a new fan at an outlying air shaft 2.8 miles from the hoisting shaft where the original fan was located. Power requirements (90,000 c.f.m. at a 3¼-in. water gage) were cut from 200 to 43 hp., in large part due to the change in location, with the higher efficiency of the new fan lending a hand also.

Sealing is, in effect, another method of reducing air travel and number of splits which must be operated, in addition to eliminating the problem of handling gases which otherwise might necessitate an increased volume of air. The savings are substantial, although hard to calculate, but some indication may be gained from the experience of one mine, where the worked-out area is many times the size of the live sections, yet 42,000 c.f.m. was being circulated four miles through 4x10-ft. headings with a water gage of 4 in. and a power input of less than 45 hp.

Proper Splitting–Lower Cost



In addition to conformance with law and safety standards, proper splitting can save a mining company considerable money in a reduction in water-gage and power for ventilation. In the accompanying simplified example, as an illustration, splitting reduced the fan water gage from 2 to 1.33 in. Horsepower required to move the air, disregarding motor and other efficiency factors, is reduced from 22.1 to 14.7.

Splitting, however, requires the use of regulators, and cases sometimes arise where forcing enough air into one long split necessitates regulation of the others to an extent materially increasing the horsepower. In such cases, an auxiliary fan in the long split may be cheaper in the long run by relieving the main fan of the load caused by extra regulation and consequently reducing the horsepower. The net savings, taking into account the cost of the extra fan and motor, can run to several thousands of dollars a year, depending upon the mine conditions.

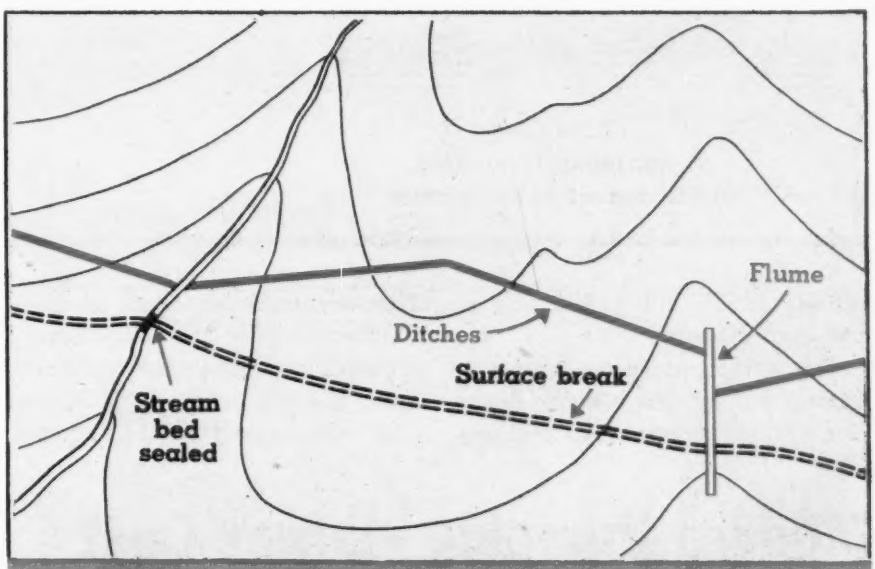
LOW-COST MINE DRAINAGE

DRAINAGE at many coal mines, like Topsy, just grows—and with it, in many cases, the cost. Proper attention to the problem can save thousands of dollars annually at mines where much water is encountered. Using gravity to save a horsepower of electricity, depending upon the rate per kilowatt-hour, results in a money saving of $100 per year, more or less; 50 hp., $5,000; 100 hp., $10,000, etc. Getting rid of even 50 hp. of pumping demand, therefore, warrants a substantial investment in modern equipment, in rearrangement of the pumping system for higher efficiency; in siphons, ditches and boreholes for gravity operation; and, to go even further, for ditches, flumes, sealing and grouting to keep water out of mines.

Where equipment is necessary to handle water, as it often is, it should be efficient, should be controlled automatically as far as possible and should be made of materials that will insure long life even in the presence of highly acid water. This includes pumps, pipe, fittings and other auxiliaries in handling and moving water. Savings in material and in maintenance and replacement labor can be substantial.

No Water–No Power Use

The first point of attack in handling water is to keep it out of the mines. The possible preventives are several, including ditches ahead of surface breaks, flumes across them, sealing of stream beds, grouting of strata inside the mine and sealing of worked-out water-bearing areas. In all efforts in this direction, it must be remembered that equipment must be installed to handle the peak inflow in wet seasons, although even a moderate average, such as 250 or 500 g.p.m., might represent an annual outlay of $10,000 for power in addition to labor and cost of equipment, pipelines and auxiliaries.



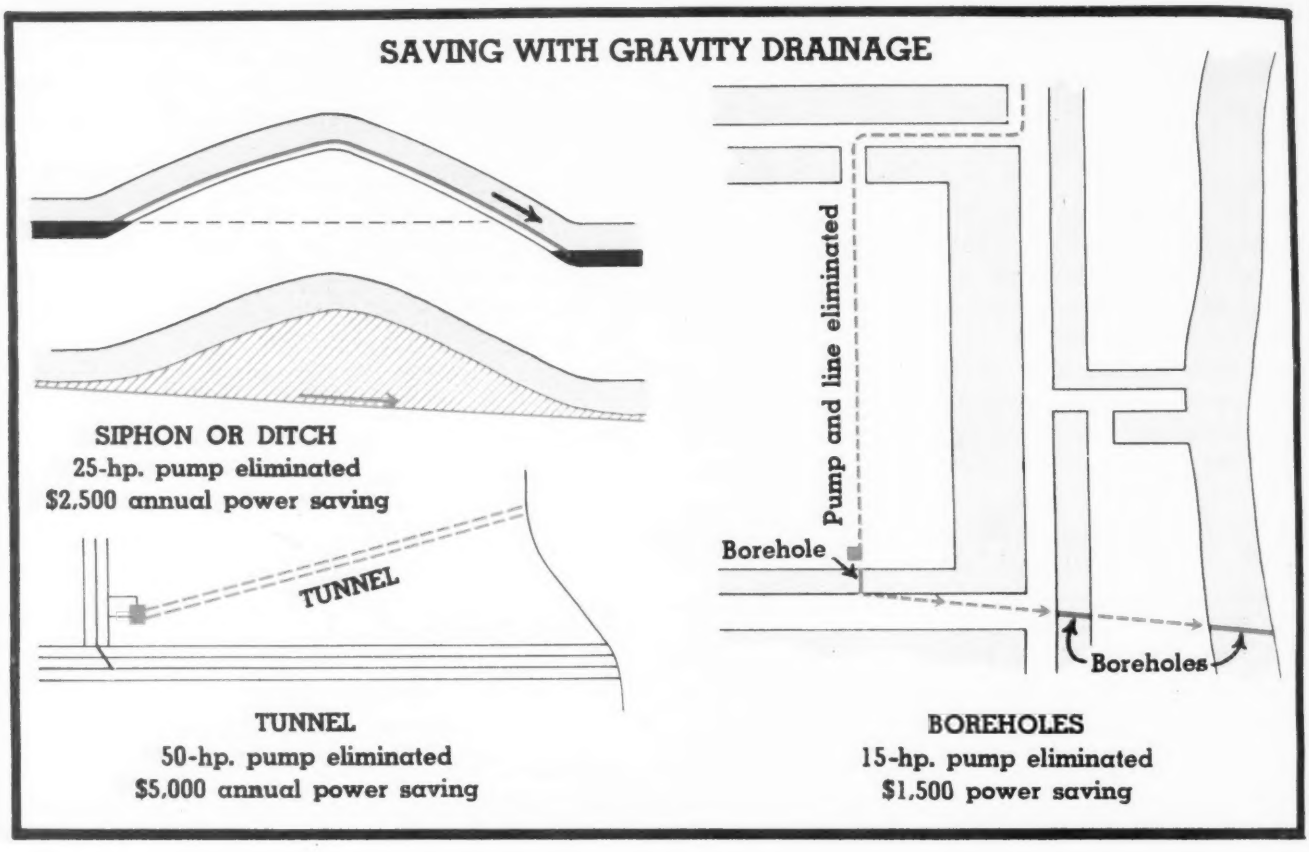
KEEPING WATER OUT TO CUT COST

Saved: 1 pump, 50 hp. $5,000 annually in power

More Gravity–Less Power

Making gravity take care of drainage eliminates pumping equipment and power—the latter normally the more important in most cases. The time-honored siphon is an excellent means of making gravity move water where it can be applied. Or a little thought and planning will create opportunities for ditching, again making gravity do the work. While cost will vary with conditions, it is seldom that a siphon or ditch will not return its cost in two or three years—sometimes less.

Boreholes through pillars and outcrops or inclined downward to outfalls in valleys or stream beds are becoming increasingly popular as a means of handling water at low cost. They save money by eliminating pumps and labor or shortening pumping distances and reducing heads. Standard equipment is available for practically any drilling problem and special units capable of holes 400 ft. or longer, in diameters up to 6 in. or more, have been developed for underground use, permitting natural drainage or pumping to the outside or through pillars into abandoned workings. If a borehole can eliminate a 15-hp. pump operating continuously, the annual power saving will be approxi-



mately $1,500 with power at 1.5c. per kilowatt-hour.

The value placed on gravity is evidenced by large-scale drainage projects running into millions. Shorter tunnels save just as much and sometimes proportionately more. One mine, for instance, spent $14,000 for a 1,450-ft. tunnel and eliminated two 500-g.p.m. pumps. Drainways often can be established in coal as well as in rock, and where this can be done it is preferable because of the inherently lower cost.

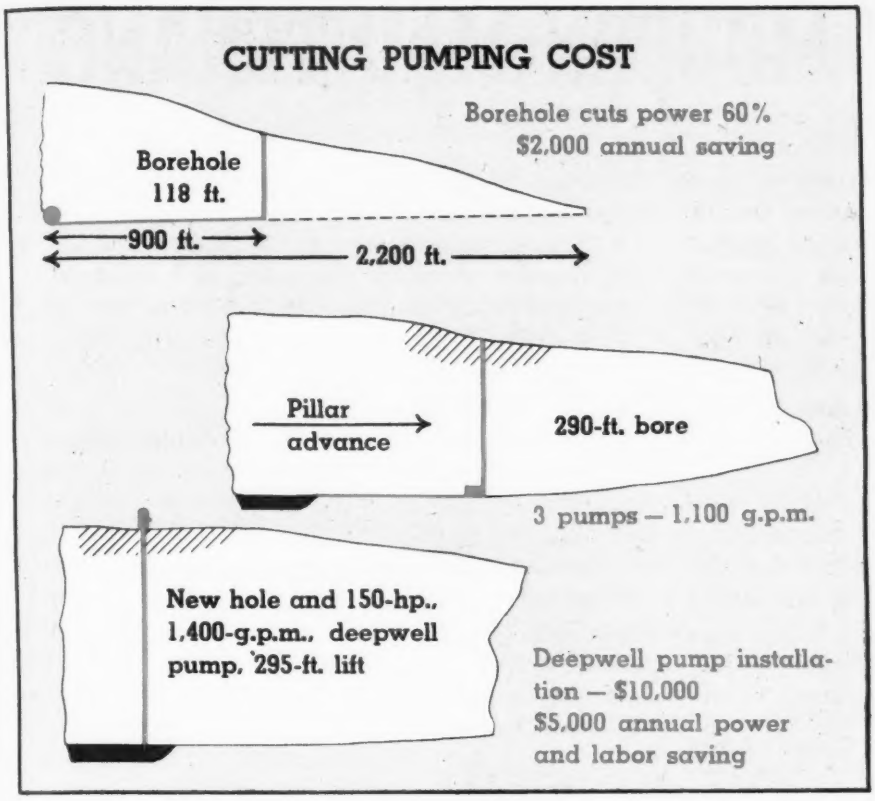
Modern Pumping–Lower Cost

Where pumps are necessary it still is possible to save substantial sums in power and labor. Automatic controls, ranging all the way from automatic suction valves on lines pulling from a number of sumps through float switches up to complete full-automatic starting, stopping and priming equipment economize on labor and improve pump efficiency. How such equipment can save can be appreciated by considering the fact that one man's wages might aggregate $1,500 to $2,500 per year or more.

Concentrating pumping, thus eliminating a number of pumps and attendants in favor of a single and more efficient station, is another step toward economy that may be taken in many mines. It involves establishment of a central sump or sumps with the necessary feeders—usually ditches. Horsepower often can be cut in half and labor as much as 75 or 80 percent. If sump capacity is sufficient, it may be possible to effect additional economy by pumping during off-peak periods.

Where pipelines are employed, size exerts a major influence on power for pumping. Erring on the large rather than the small side is preferable. For clean cast-iron pipe, as an example, the friction head per 1,000 ft. when the diameter is 4 in. (250 g.p.m.) is 43.47 lb., equivalent to an added pressure of 18.83 lb. per square inch. If the diameter were increased to 8 in., friction head would be 1.52 lb., or 0.66 lb. per square inch per 1,000 ft. The difference in power can run to $500 or more annually per 1,000 ft. of line. Keeping lines clean is imperative for low-cost operation, since coatings can easily cut capacity 50 percent.

Shortening distance by driving special openings or boreholes to the outside, including vertical holes, is another drainage economy. An example will give a hint as to the possibilities. By substitut-



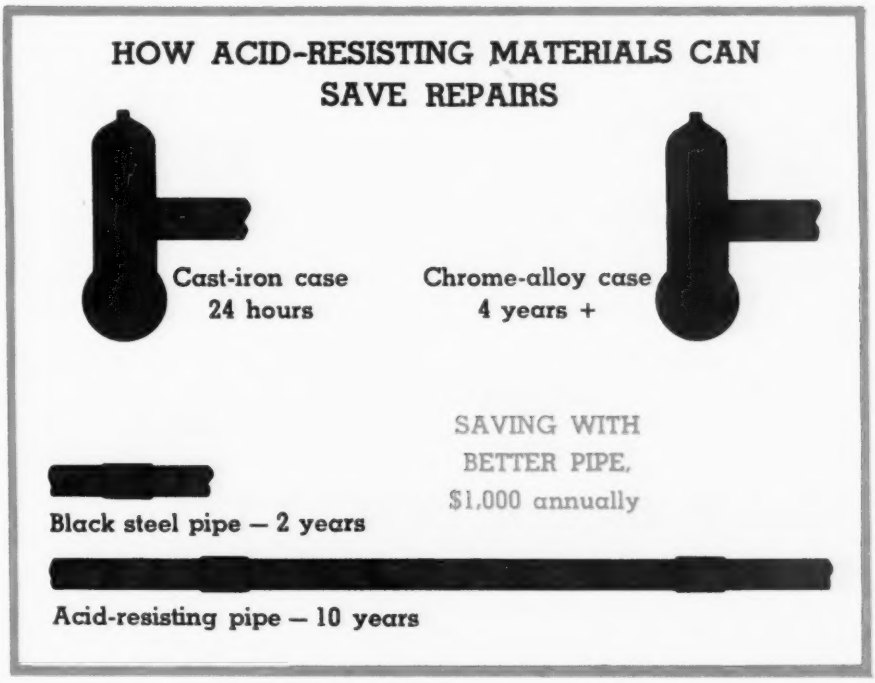
ing a 118-ft. vertical hole to the surface 900 ft. from the pump for an additional 1,500 ft. of 3-in. line, the power cost in one case was cut 60 percent for an annual saving of $2,000.

Substitution of deepwell turbine equipment for the usual type is another economy measure becoming increasingly popular. Savings sometimes are tremendous. In one instance, a 60-hp. deepwell unit in place of three 100-hp. centrifugals did the job equally well at a cost of approximately $180 per month for power, against $1,000 for power with the original installation besides labor cost. The accompanying illustration shows another case. Replacing three existing pumps (1,100 g.p.m.), a 150-hp. 1,400-g.p.m. deepwell machine saved $1,512 in power cost per year, with a total saving (including labor) of $5,000 annually.

Acid Resistance—Lower Cost

Forethought in providing proper materials for pumps, pipe and fittings can save coal-mining companies thousands of dollars in handling bad water. The extra investment frequently is returned in one or two years. Bronze, chrome or other alloys, rubber, stainless steel and other materials lengthen pump life materially. A classic instance was replacement of a cast-iron case which normally lasted only 24 hours with a chrome-alloy case that was still in good condition after four years.

Ordinary steel pipe is equally susceptible to the ravages of acid water, often lasting less than six months or a year. Long-lived substitutes include cast iron, wrought iron, copper-bearing or other alloys of steel, wood, rubber, fiber, asbestos-cement, sewer tile, wrapped-and-lined steel, cement-, lead-, rubber- and bituminous-lined steel, etc. Labor in replacement often is more vital than the extra cost. In the case of a 2,000-ft. permanent line, for example, life of plain steel pipe might be two years, whereas life of an acid-resisting type, costing perhaps double, might be ten years or more. Thus, the steel pipe (cost, $1,500) might have to be replaced four times in ten years at a labor cost of $4,000, making the annual saving approximately $1,000, minus the extra cost of the acid-resisting type. To achieve such savings, substantial additional investments in better materials are warranted in practically all cases.



SAVING WITH MODERN MAINTENANCE

MACHINERY must operate to produce coal and thereby a profit. Good maintenance means the difference between, say, delays averaging 6 percent of the working shift and 1 percent, the difference representing one-twentieth of the working shift as far as opportunity to produce is concerned. Frequently, the loss is even greater and since crew wages go on during the idle periods the cost per ton is increased, reducing still more the net return to the company.

Maintenance includes kinks and shortcuts as well as major organization and system. Good organization and system, however, will stimulate the discovery of kinks and shortcuts. Some of the fundamentals of good maintenance are:

1. Good, well-equipped main and auxiliary shops.
2. Good, well-trained maintenance men, including men in the working sections.
3. Supervisors who know equipment and the value of good maintenance.
4. Trained, careful machine operators.
5. Regular, thorough inspection and overhaul.
6. Good reports and records of machine condition.
7. Ample supplies and parts at points of need.
8. Spare production units.
9. Quality materials.
10. Careful, systematic lubrication. Methods may vary but the slight extra cost of the best in lubricants and methods is so much less than the losses resulting from poor lubrication that there should be no question about cutting corners.

Some of the things which go into good maintenance and how they can increase production and cut cost are set forth in the following example, based on a loading-machine operation. Results with other equipment or conditions naturally will vary.

WHAT MODERN MAINTENANCE CAN ACCOMPLISH

21c. per ton total maintenance cost

DAILY SECTION REPORT

Sec. 9 Date 12-14-40
Units working 2 Shift 2nd
Cars loaded, coal 150
Cars loaded, slate 12
Cars loaded, total 162

Maintenance delays:

Cutters	35	Min.	Clutch & Control
Drills	15	Min.	Switch
Loaders	50	Min.	Jack & Motor wire
Locos	10	Min.	Brake shoe
Pumps	5	Min.	Lead burned
Total	115	Min.	

Other delays 25 Min.
Explain Pot in room 16E.

11c. per ton total maintenance cost

DAILY SECTION REPORT

Sec. 20W Date 12-15-43
Units working 2 Shift 2nd
Cars loaded, coal 194
Cars loaded, slate 14
Cars loaded, total 208

Maintenance delays:

Cutters	5	Min.	Replace hose
Drills		Min.	
Loaders	10	Min.	Change cable
Locos		Min.	
Pumps		Min.	
Total	15	Min.	

Other delays 30 Min.
Explain Gas - Clay vein room #3

HOW IT WAS DONE

CUTTING COSTS WITH GOOD MAINTENANCE

Tonnage increase, 29 percent; maintenance cut, 10c. per ton

Old Maintenance Methods	Modern Maintenance Methods
Equipment seldom inspected—men too busy fixing and patching.	Running inspections made daily; complete inspections and repairs weekly.
No reports made on condition of individual equipment units.	Daily and weekly reports made for each equipment unit.
Running repairs left to face bosses and operators, with occasional help from shop staff on bottom.	Qualified repairman stationed in each section.
Lubrication left to operators.	Lubrication under section repairman or done by crews with special equipment.
Supervisors and men learn their jobs themselves the hard way.	Bosses, operators and repairmen all given job training.
Loaders dragged to shop on rails; no trucks, parts crates, etc.	Special trucks provided for moving loaders and heavy assemblies, with special crates for parts, such as armatures; also special welding trucks, tool and repair cars for work away from shops.
No repair pits except in main shop on the bottom.	Repair pits with cranes installed in both east and west sections of mine.
Bottom shop equipped with machine tools, wheel press and one stationary arc welder; no special jigs or testing units.	Following added to bottom shop: cable vulcanizer, test stands for hydraulic pumps and drills, jigs for welding certain parts, pinion and gear pullers and other special tools, complete line of hand tools for workmen.
Delays and inadequate repairing result from inadequate supply system.	Supply distribution and purchasing revamped to reduce delays.
Repeated machine breakdowns result from rock handling.	Parts failing frequently rebuilt to stand the service.
No complete overhauls in four years of loading-machine operation.	Two spare loaders provided—one always ready, the other replacing unit being overhauled.
Armatures the only spare "units" kept repaired and ready for replacement.	Tail conveyors, heads, cutter bars, complete motors and other assemblies kept repaired like new for exchange.
Armatures rewound in bottom shop; coils bought on price; dipping and baking equipment inadequate.	Armatures sent out to reputable shop for the best possible job of winding by specialists using highest-grade insulations, including asbestos and fiber-glass for high temperatures.
A.c.-d.c. voltmeter only portable electric meter available.	Tong-type ammeters purchased for both a.c. and d.c.; also portable recording d.c. millivoltmeter with resistance and shunts for use as voltmeter and ammeter, and insulation tester.
Locomotive tires turned twice and then scrapped.	Tires filled by arc-welding, using automatic welding head, at a saving of 50 percent.
Plain carbon steels used for renewal of shafts, axles, etc.	Alloys steels purchased for making new shafts for armatures and other vulnerable equipment parts.
No specialized equipment for reclaiming shafts, axles and parts.	Metallizing equipment installed for reclaiming and repairing shafts and other parts, protective spraying, etc.

LOW-COST SUPPLY SERVICE

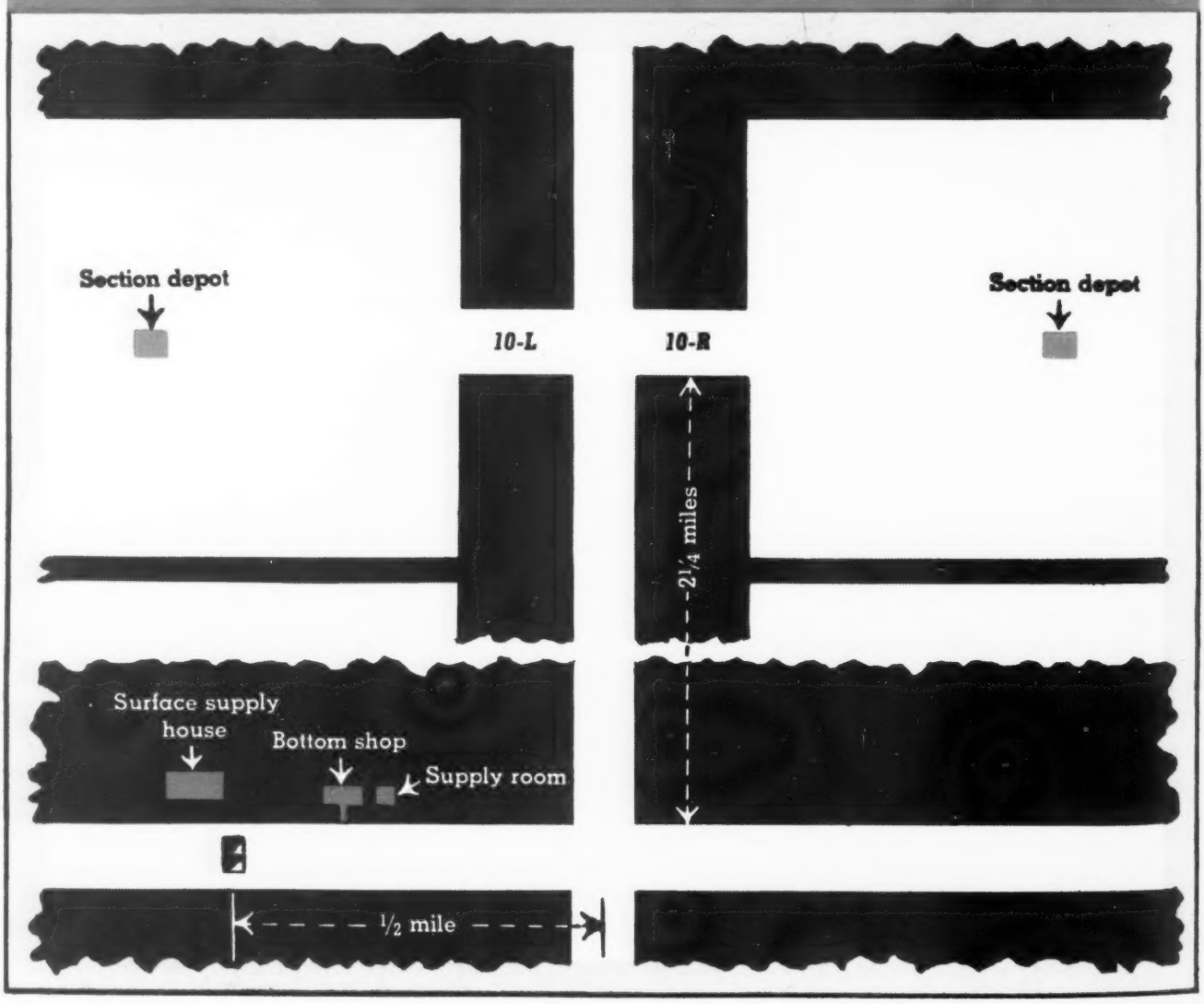
NEXT TO LABOR, materials and supplies constitute the largest single item of expenditure in coal mining. Aside from their own cost and the cost of handling and distributing them, lack of supplies at the point of use when needed can cut production materially because of delays suffered while they are being hunted down and brought in. Thus, an hour's delay waiting for a small part for a gathering conveyor when only 10 minutes would have been lost if the part had been at or near the loading station might cost 25 tons of output worth, say, $65 in the railroad car, in addition to the higher cost of the reduced tonnage produced that shift.

Handling supplies for economy and increased mining efficiency includes:

1. Good receiving and storage facilities.
2. A good record system operated by a trained man or men.
3. An efficient distribution system which assures on-time delivery in good condition to the right places.
4. Auxiliary supply depots at strategic locations.
5. Records showing use by equipment units to prevent misuse of both machines and materials and indicate need for maintenance.

Evidence of how good supply systems and methods can save in materials cost and improved output is given in the following example, which also lists many of the critical factors in modern supply service. The advantages will vary with varying conditions at different properties, but where mechanical mining is practiced the need for a modern supply system is enhanced with corresponding rewards.

SUPPLIES WHEN NEEDED—HIGHER TONNAGE



MODERN SUPPLY SYSTEM—Lower Cost—Higher Efficiency

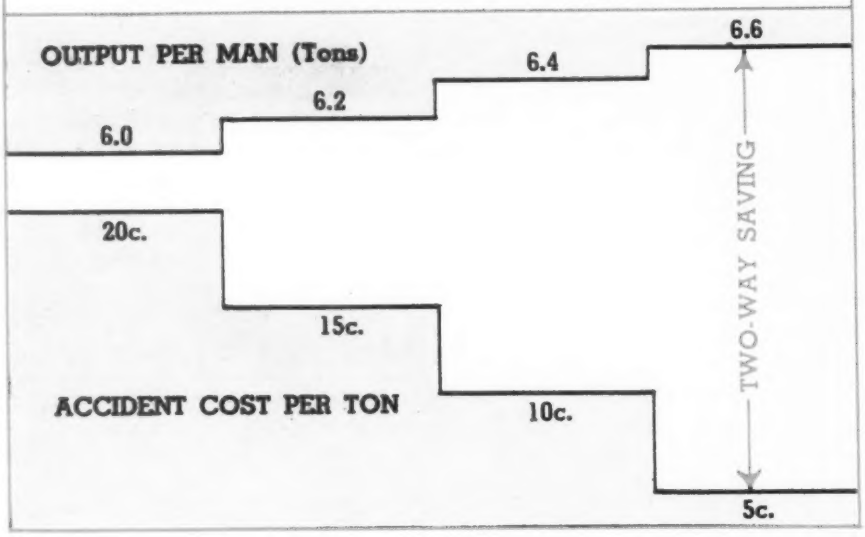
Supply Cost Cut 6c. per Ton; Unit Production Raised 25 Tons

OLD SYSTEM	MODERN SYSTEM
Unloading platforms too small, cramped storage facilities, inadequate shed and rack facilities, no cranes or derricks for unloading and handling heavy items.	Size of loading platform increased; sheds and racks built for easy storage and protection of bar stock and other materials; unloading and handling derrick installed and supplemented by truck-mounted portable unit.
Records inadequate for stock control and costing of supply items.	Perpetual inventory installed, with trained man to operate.
Repair and spare parts kept in supply house on surface; bins unhandy and inadequate; floor space too small; lighting very poor.	Auxiliary supply room installed underground adjacent to bottom shop and all repair parts for underground equipment moved down from surface; plenty of handy bin space provided with good lighting units positioned to reflect back in bins.
No supply depots in working sections.	Supply depot in each working section, as in Panels 10-L and 10-R; standardized small supply of emergency electrical and mechanical items, plus such things as friction tape, kept in each such depot.
Available records do not show delays resulting from waiting for supplies.	Daily and weekly maintenance reports include data showing how parts are used or misused and what items should be kept in working sections.
Lubricants taken underground in 5-gal. cans; explosives storage and handling facilities unsafe and inadequate.	Fireproof oil room constructed underground in conjunction with new shaft-bottom supply house; truck with three 70-gal. tanks built for delivering oils and liquid greases to sections; safe explosives house and powder cars provided.
Several types of equipment used, increasing stock of spare parts.	Equipment well standardized by trading with other operations and replacement.
RESULTS	***RESULTS***
268 tons per loading unit per shift.	283 tons per loading unit per shift.
38c. per ton over-all supply cost.	32c. per ton over-all supply cost.
1.1c. per ton lubricant cost; much loss due to spillage, poor supervision and contamination with dirt.	0.8c. per ton lubricant cost; damage to bearings from "sandy" lubricants eliminated.
$10.50 stock of spare and repair parts per ton of daily production.	$8 stock of repair parts per ton of daily production.
Seven men employed handling supplies on the surface; 5 lost-time injuries in a year.	Four men employed handling supplies on the surface; one lost-time injury in a year.
68 minutes required to get a part to the face from outside supply house after it is requested.	7 minutes average time required to get a repair part to face from section depot.
Six fires and one explosives accident in a year in handling lubricants and powder.	Risk of oil fires and explosives accidents practically eliminated; new underground oil house includes clean concrete floor, drainage trenches, barrel pumps, approved lighting fixtures and gravity-closing firedoors.

MAKING MONEY THROUGH SAFETY

SAFE MINING IS EFFICIENT MINING

Greater safety and lower accident cost normally are accompanied by an increase in individual productivity, as indicated in this example, which usually is equivalent to a further saving per ton approximately equal to the saving in accident cost.



SAFE MINE OPERATION prevents human suffering and loss of life. The money cost of taking care of and compensating for injuries can be measured with some accuracy and likewise the possible savings, which are substantial. Equally substantial but less easy to determine as accurately are the savings resulting from decreased damage to and destruction of producing facilities and equipment and higher tonnage and efficiency.

Organizations that have gone the farthest in safety, available data indicate, have reduced direct cost of injuries and fatalities to as little as 3 to 5c. per ton. The average for bituminous mining probably is in the neighborhood of 8 to 10c. per ton and for anthracite operations around 75 percent more. Some authorities have estimated the indirect cost of coalmine accidents at as much as or more than the direct cost. This conclusion is supported by evidence that the increased efficiency attained at many operations as a result of thoroughgoing safety work is as much as 10 percent or more.

So safety really pays, both in reduced cost of injuries and in higher efficiency, not to mention repairs to equipment and restoration of facilities. If it were possible to cut direct and indirect accident cost only 5c. a ton, the saving on a daily output of 2,000 tons would be $100; in a year of 200 operating days, $20,000. Such savings warrant fairly heavy expenditures for such things as safer and more efficient equipment, improvement of mine or plant condition, better timbering and similar safety measures, with the assurance that the necessary investment would be returned in a relatively few years while the cut in cost would continue indefinitely.

Safety work is rooted in both determination and knowledge. Management must first be sold on its value and must see that everybody down the line is sold. And to really uncover the opportunities for progress and check on it as it is made, complete records are a necessity. In view of the importance of the collateral elements in an accident, it would seem logical that the accident record should include not only when, where, how and to whom, along with any direct costs that might be incurred, but also should include the indirect costs as far as they can be determined or estimated. Thus, to complete a record of accident cost, loss of tonnage, cost of reopening the place, cost of repairs to the equipment and other items of a similar nature should be included.

A strong safety organization can materially increase the effectiveness of safety work and the services of a full-time safety supervisor, at the least, usually is repaid several times. Foremen and bosses, however, probably are the biggest elements in the success or failure of safety work. They must be thoroughly sold on the idea that the company wants them to think safety first and should be thoroughly trained in the principles and practice. Some companies have found some material reward for good records — or at least a chance at such an award — a stimulus to interest and progress, not only among foremen and bosses but among men. And while the leadership must come largely from above, safety work gets farthest when the participation of the worker is enlisted. He then becomes an interested partner.

Bosses and men work better on any project when they understand what it is about and have a set of rules to go by. Safety work therefore fares best when it is explained and explained again and when a code of rules and

safe practices is available. Such a code is worth considerable engineering investigation and should be revised when changing conditions indicate the need. Training in first-aid and mine-rescue work insures not only this vital life-saving skill but also has been found one of the best interest stimulators and educational opportunities available.

Spirit and enterprise, while a major item, can assure but little progress when physical conditions are adverse. Putting mine and plant in first-class condition therefore is a major step in advancing safety. Good housekeeping, removal of natural hazards, providing guards, maintaining clearances, good lighting, refuge holes and similar measures make it easier for men to make themselves safe. Constant attention to removing hazards and keeping mine and plant in good condition is a vital item in making safety pay.

There are other and more serious hazards than those that might be called stationary or passive in coal mining. These are dust and gas. The first line of attack in taking care of gas and dust is good ventilation. Then comes permissible equipment and materials, good electrical installations, elimination of all other possible sources of ignition, rock-dusting and sprinkling or other methods of controlling or eliminating dust and thus eliminating explosions.

The major cause of fatalities and injuries in coal mining, however, remains falls of roof and coal. The remedies are not spectacular but they work when applied continuously and consistently. They include training of bosses and men in judging and testing top and – the most important of all – systematic timbering supplemented by safety posts, jacks, bars or other temporary support in the area of greatest danger – the face zone.

Fatalities are what usually make the news but they are by no means the measure of the total suffering, damage and loss of production experienced in coal mining. In addition to some 1,248 deaths in the bituminous industry in 1943, non-fatal injuries are estimated at 51,200, or a rate of approximately one man injured for every eight employed. In anthracite, where some 228 deaths occurred in 1943, non-fatal injuries are estimated at 15,500. Thus, one out of about every five employees was injured or killed in 1943 in that industry.

The accompanying tabulation shows some of the things that might be embodied in good safety work and what the results might be. But there is ample reason for the feeling that present accident rates could be cut at least in half with little extra effort or expense, with a corresponding decrease in cost to the industry and a higher standing in the public eye.

CUTTING ACCIDENT COST

Accident cost was

12.9c. PER TON

These safety measures reduced it to

- Management sold on safety.
- Good records of accidents, their causes and costs.
- Strong, well-staffed safety organization.
- Supervisory cooperation enlisted.
- Employee participation enlisted.
- Family and community support enlisted.
- Complete code of safe practices adopted.
- Thorough training of bosses and men in safe machine operation and other safe practices.
- Continuous education in safety.
- Accidents thoroughly investigated to prevent a repetition.
- Mine and plant continuously improved.
- 100-percent first-aid and mine-rescue training.
- Ample first-aid and rescue equipment on hand.
- 100-percent protective clothing (goggles, hats, shoes, etc.)
- Good ventilation to the face.
- Permissible equipment.
- Permissible explosives and blasting devices.
- Safe explosives storage and handling facilities.
- No open lights or smoking.
- Rock-dusting and rock-dust barriers.
- Sprinkling and other dust control.
- Good, systematic timbering based on engineering studies.
- Thorough training in testing and handling roof.
- Safe haulage equipment and practices.
- Safe man-trip equipment.
- Clean, well-lighted and unobstructed haulageways with good roof support.
- Ample clearances and shelter holes.
- Safe electrical equipment and practices.
- Clean, well-arranged, well-lighted and fireproof shops, tipples, oil houses, etc.
- Complete guarding of equipment and hazardous areas, sealing, etc.
- Ample fire-fighting facilities, both above and below ground.

4.4c. PER TON

MODERN COAL STRIPPING

COAL STRIPPING is materials handling in one of its most advanced forms—a form making the maximum use of machinery. The higher investment in equipment makes it even more important that this equipment be given the best possible opportunity to operate at or close to the capacity built into it for the most efficient use of manpower and lowest cost. Since the manpower is the same in both cases as a general rule, operation at, say, 95 percent of capacity instead of 80 means a substantial reduction in cost.

Use of larger equipment, such as a truck, is a second major means of conserving manpower. The investment in, for example, four haulage units instead of eight normally is no more and usually is somewhat less, but the wage bill usually is cut in half, with a substantial saving in the course of a year in addition to a cut in maintenance and other costs.

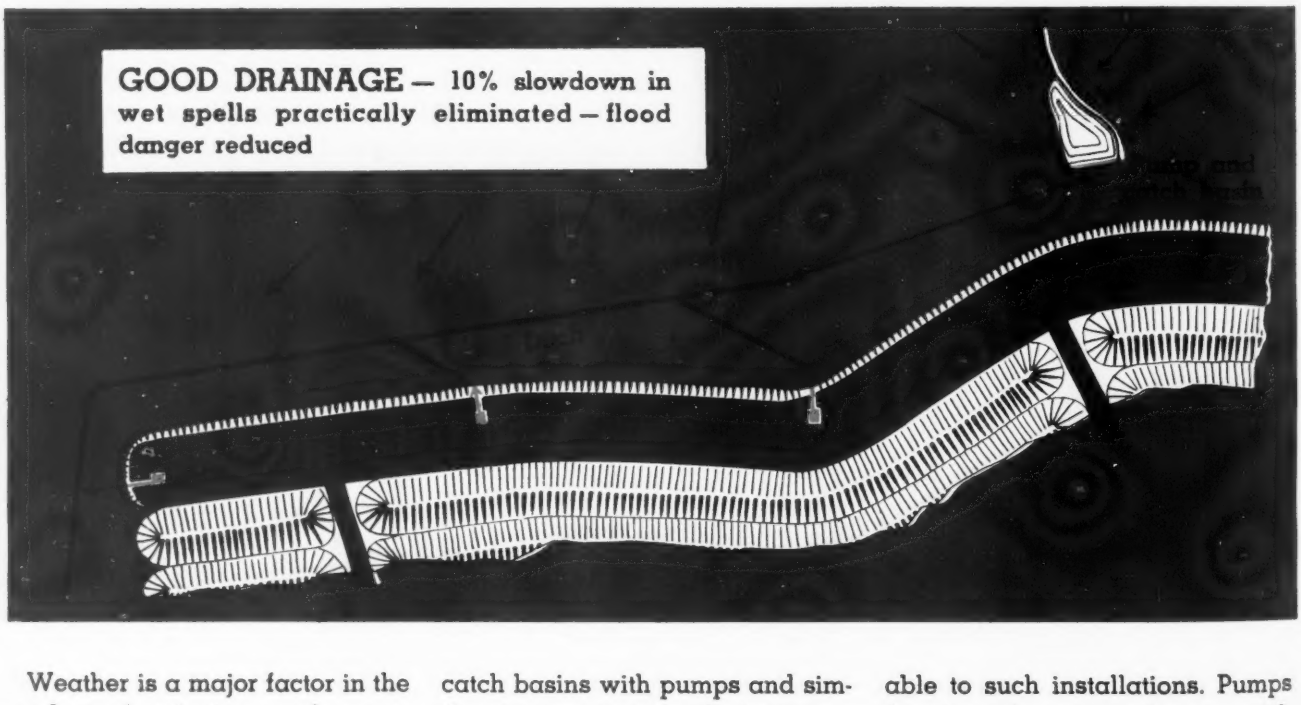
Opportunities for cutting cost in stripping therefore fall into two general classes:

1. Increasing operating time per stripping and loading unit, involving efficient conduct of drainage, preparation of overburden, haulage, maintenance and other activities.

2. Use of larger equipment.

To sum up, the objective is to keep the stripping and loading units at work at as near capacity as possible, thus insuring the maximum tonnage of coal per unit and per man delivered to the preparation plant. Some of the ways in which this objective can be attained are summarized in the following material, with due recognition of the fact that circumstances alter results and therefore may modify the savings suggested in the examples offered to indicate where the maximum results may be expected.

Good Drainage—More Tonnage



Weather is a major factor in the conduct of stripping work, especially wet and freezing weather. Water can affect stripping and loading all the way from a 5 or 10 percent slowdown to flooding of equipment and complete stoppage of work for several days. The first line of attack is to keep water out of the pit as much as possible. Ditches ahead of the high wall, catch basins with pumps and similar steps go far toward taking care of this part of the job.

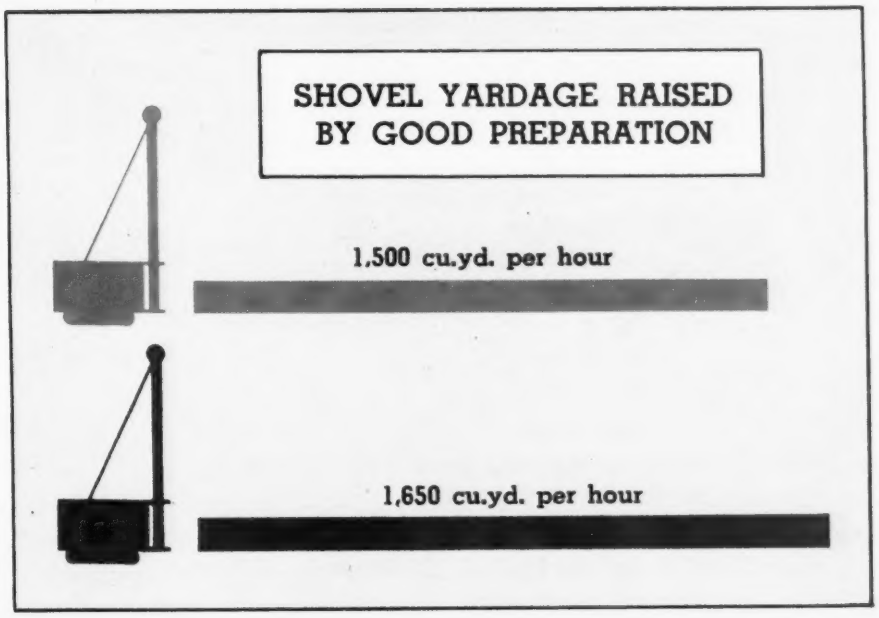
Handling water which enters the pit, assuming that it is not self-draining in part or in whole, necessarily is a matter of pumping. An alternative is putting concrete, tile or other lines through the spoil banks to drain the low spots in the pits, provided the slope is favorable to such installations. Pumps for pit work necessarily vary with the job to be done and consequently range from small portable units up to large, relatively permanent installations with self-priming equipment and semi- or full-automatic control, usually supplemented by sumps of some capacity. These sumps may be fed from ditches or by the portable

units within reach. Or the portable units may pump over the high wall to drainage facilities.

Water sometimes is pumped back into the spoil, although this practice normally is frowned upon unless it is put far enough back to make sure that it will not encourage slides. Also, if the coal slopes down to the pit, pumping back to the spoil usually means that the water seeps back and has to be rehandled. In pumping to the high wall, a number of operators employ lateral ditches to carry the discharge to main ditches or catch basins. This saves laying extra pipelines or hose, the latter being the most popular where the smaller portable pumps are employed in stripping work.

Good Preparation — More Yardage

High stripper production depends more on good overburden preparation, perhaps, than any other factor, although these others contribute their share in increasing efficiency. And good overburden preparation also is the largest single factor in cutting the cost of stripper maintenance. Extra money for powder and drilling, if necessary, therefore, is money returned manyfold in higher output and lower maintenance.



Varying conditions naturally have resulted in a wide variation in drilling and shooting problems at strip mines and for that reason no two plans are identical. In fact, some properties change plans regularly with changes in the character of the material. Some have found, also, that prospect drilling helps materially in varying the drilling and shooting plan at the right time for better efficiency. In any event, careful engineering investigation of overburden, possible drilling methods and possible explosives, plus experienced bosses and men in the field, are essential to good overburden preparation.

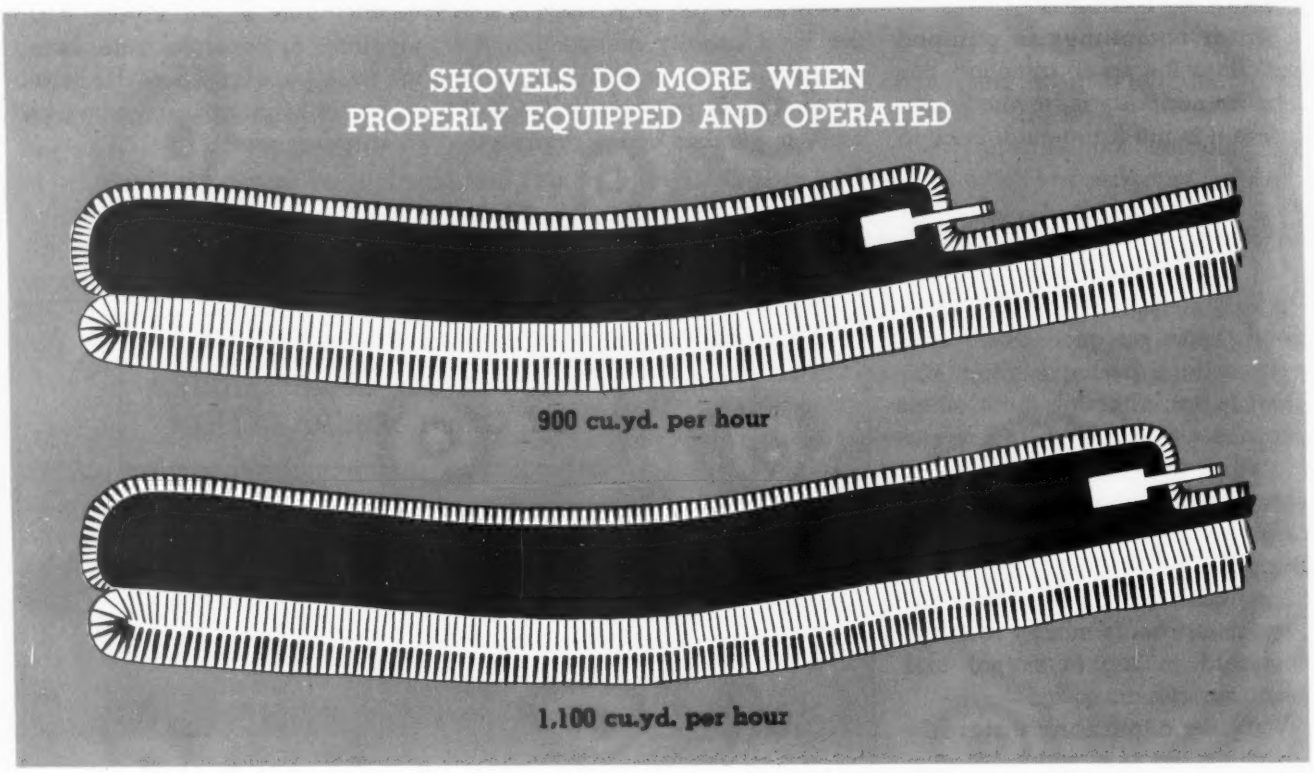
Modern drilling equipment can aid materially in keeping cost down in this department. Where the character of the overburden is right, the horizontal auger drill is by far the most efficient and cheapest drilling unit. The operator who needs vertical holes, however, has a choice of several modern equipments. For instance, there is the larger, faster well drill with capacity to carry bigger tools. The benefits of such units are several. Among others, they drill up to 50 percent faster, thus conserving manpower. Also, the bigger tools often permit a wider spacing of holes because of the larger charge that can be used per hole, thus saving in this direction also. Vertical augers, where the character of the rock permits, materially speed the drilling process. Another new drill making possible 50 percent or more footage per shift is the rotary oil-well-type rig. When, as often is the case, one new-type rig can do the work of 1½ or two of the old type, the extra cost can be recovered in a relatively few years.

The results of revising drilling and shooting will vary, as stated, from property to property, but an increase of 10 percent or more in shovel yardage is not unknown and in all cases study of overburden preparation and the installation of modern equipment and methods has been followed by a substantial increase in stripper yardage and a cut in maintenance.

Raising Shovel Output

Increasing stripping or loading capacity by installing additional equipment, of course, is a relatively easy matter. Often, however, this increases cost because the auxiliary equipment is used for rehandling at least a part of the spoil or is inherently lower in capacity for the same investment and manpower. Where it is a question of recovering coal under, say, heavier-than-normal burden, however, such a step, of course, is unavoidable.

Other factors also influence the



final decision, such as the value of the coal. Thus, if the coal commands a high price, installation of auxiliary units or a lower-capacity machine able to operate at greater depths may be entirely justified. Or if a rider seam is present, its recovery may warrant a supplementary stripping unit.Thus, the final choice may be influenced by a number of factors, although it is a fundamental principle that if the entire job can be done and the required rate of production maintained with a single unit it normally is the cheapest.

There is, however, another aspect to the question of using auxiliaries, such as tractor-powered scrapers, small draglines and other miscellaneous equipment. The applications are box-cutting, ditching, cleaning up slides, building dams and roads and other dirt-moving or construction jobs. In many of these, of course, it is impossible to consider using the main stripping unit. However, the main unit sometimes is put on jobs where an auxiliary would serve better at a lower cost. Cleaning up slides in the pit is an example. Diverting a big shovel to such work is manifestly uneconomical. Keeping it at its primary job—stripping—and using a smaller, more versatile unit in slide-cleaning and similar work normally is the economical alternative. The same reasoning supports the use of a tractor and bulldozer with the stripper, which then is freed of much of the unproductive passing necessary for a good clean-up and consequently is able to turn out a greater yardage.

Bigger, lightweight dippers have accomplished wonders in increasing the capacity of stripping equipment in late years. Their construction, which permits increasing capacity up to 50 percent with the same or slightly greater loaded weight, has been responsible not only for the large capacity of new shovels with no great increase in size and weight but also has enabled old shovels to handle a materially higher yardage. Where old-style heavy dippers or buckets are employed, either on strippers or loaders, their replacement still remains a major method of increasing capacity with few other changes. Along this line also, one school of thought holds that lightening weight even further, even at some sacrifice in life, is more than compensated for by higher production.

Dipper or bucket design also influences performance by determining how well the unit fills itself either in overburden or coal, especially the latter. In designing the coal-loading dipper, a thin seam generally warrants a broad, shallow dipper or adoption of the thrust-loading principle, both facilitating separation of the coal from the bottom as well as filling the dipper in one pass. Cutting teeth on the sides of dippers are being more and more adopted to speed digging and insure a better berm.

In coal loading, also, the ease with which the coal can be picked up is reflected in the capacity. Thus, unless there are compelling reasons to the contrary, the coal should be shot so that it is loose and easy to load. To speed the drilling process, the faster, less ex-

pensive electric auger is being increasingly adopted, and in a few cases mobile units with two adjustable pivoting arms, each with a pneumatic or auger drill, are being employed to further cut drilling time and conserve manpower.

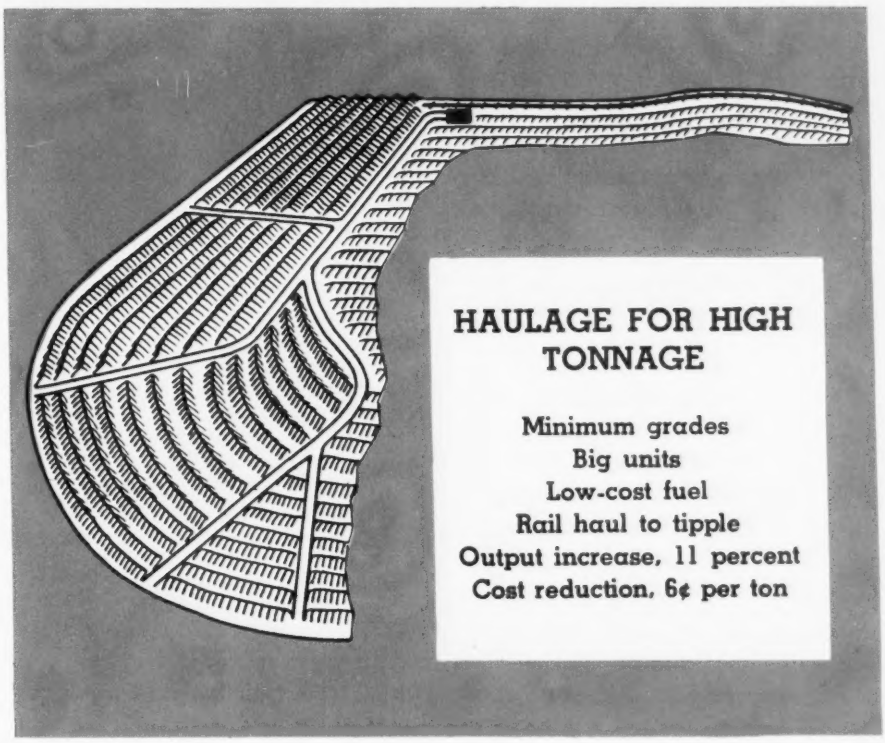
New electric controls are another item making for faster, smoother operation of large stripping equipment with consequent increase in capacity and reduction in maintenance. These controls, being applied on new stripping and loading shovels and as a substitute for conventional controls on equipment already in service, are credited by some authorities with increasing yardage or tonnage as much as 10 percent.

Even such small things as material freezing on dippers in cold weather can materially affect shovel performance, in addition to the larger things such as proper pit layout and operation, overburden preparation and the like. One operator reported delays from freezing at as high as two hours a shift in cold weather. They were eliminated by installing heating elements on the dipper. Going even farther, adequate heating of the cab in the winter and cooling in summer can make a substantial difference in the unit output.

Although, to reiterate, circumstances alter results, proper attention to the big and little things which can affect stripper and loader performance will result in an increase in yardage or tonnage of as much as 10 percent or more, aside from the effects of such changes as larger dippers or buckets, with consequent reduction in cost of coal delivered at the preparation plant.

Low-Cost Transportation

Automotive equipment has taken over a large part of the transportation job at strip mines because of its lower cost, greater flexibility and elimination of complications in the pit. Several years of experience, however, has shown that it has its limitations, although these limitations are rather flexible, depending upon natural conditions, length of haul, size of units and other factors. But when the haul is much over three or four miles—some place it at 1½ or two—a number of operators have found a combination of rail and automotive equipment, connected by a field transfer station, the most satisfactory and economical. And in a few instances operators maintain that rail haulage, if properly set up, is no more expensive and sometimes is considerably cheaper.



In line with the usually prevailing principle, use of the biggest possible haulage units normally results in the lowest cost. Four 40-ton tractor-trailer units, for example, might cost $65,000, compared with $80,000 for eight 20-ton units, but the savings in wages for drivers, aside from maintenance and attendance, might be $6,000 to $7,000 a year or more, depending upon rates and days worked.

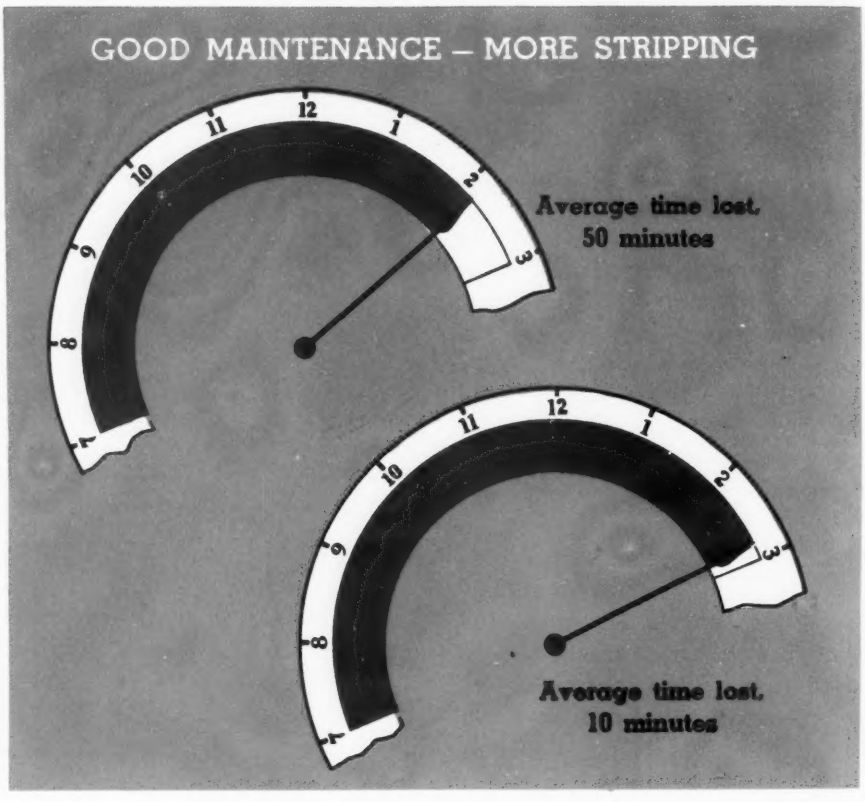
Motive power in strip haulage is evolving away from gasoline to butane and diesel. While butane requires pressure equipment, it normally provides 10 percent more power, is cleaner and reduces engine maintenance. Diesel equipment uses less of a normally less-expensive fuel, requires less maintenance and provides more power. Supercharging increases the benefits. In one case, use of supercharged diesel equipment in place of gasoline engines cut fuel consumption in half while the units were able to travel up grades in a 1 to 1½ higher gear and speed.

Other things being equal, roads materially influence the efficiency of automotive as well as other haulage, not to mention maintenance and that vital item today—tire life. Good roads—meaning a good subgrade, good drainage, ample width, a good running surface sealed against water and minimum grades—have been found to be worth every cent of their cost, even $10,000 to $15,000 a mile or more. Some operators

are limiting grades to 1½ to 2 percent maximum, even at pit entrances. They rest their case on the difference between operating at, say, 20 m.p.h. and 8 or 10 or less over considerable distances, aside from the added strain of uphill operation and wear and tear in shifting gears. Good roads, experience indicates, can increase the capacity of the same haulage units 10 to 20 percent or more.

Maintenance for High Efficiency

In view of the big investments per equipment unit in stripping, preventive maintenance takes on added importance. Careful, frequent inspection is the first line of attack and permits taking action when a little work will do the trick rather than risking a major breakdown through failure to catch things in time. Good records of machine and part condition naturally supplement careful inspection. They show where the major troubles are encountered and consequently where corrective work will pay the biggest dividends. Good shop facilities must back up field work. The best in lubricants, lubricating equipment and methods, of course, is mandatory.

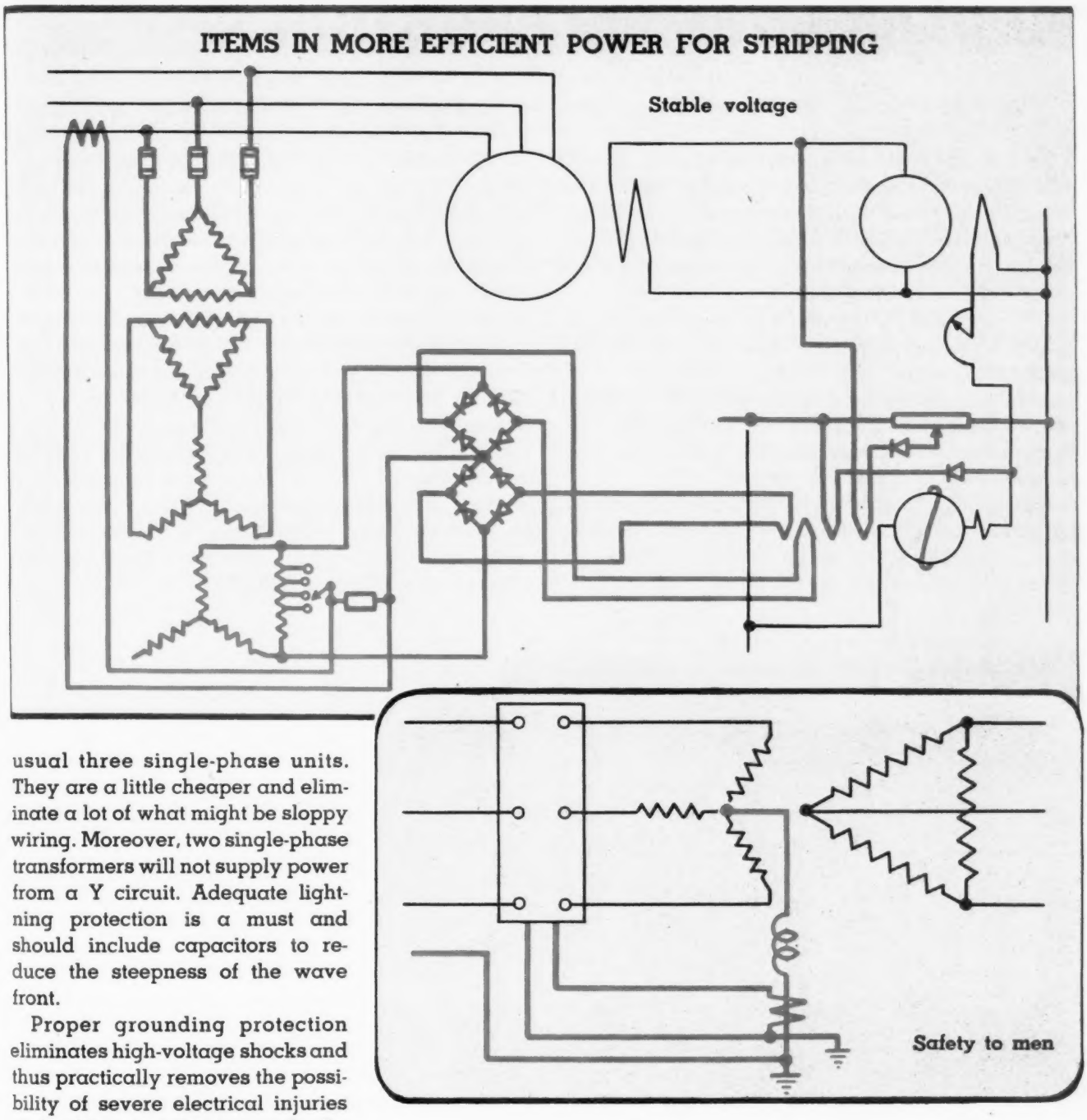


The right supplies at the right place can materially reduce time lost in repairs and replacements. One stripping organization reports that delays in changing dipper teeth, power cables and latch rigging is greater than delays from major breakdowns. Consequently, the necessary spare equipment for such replacements is kept on each shovel so that it does not have to be brought in when needed. The main supply house and additional maintenance equipment, including welders, are stationed at a field shop less than 1,000 ft. from the pit. This organization keeps a close watch for items, such as bushings, which fail quickly and replaces them with redesigned and improved units which last longer and reduce lost time. It also has provided heating equipment to prevent dipper-handle breakage in cold weather. Proper tool equipment on hand where needed and the provision of parts assemblies ready for replacement as a unit are other measures found helpful by many stripping organizations, along with proper block-and-tackle and hoisting provisions at strategic locations on equipment.

Power for Higher Output

Maximum continuity of service, stable voltage and safety to men are the major items in electrical supply to stripping equipment. In addition, the system must have a high degree of flexibility in serving shovels, other pit equipment and miscellaneous loads, including the preparation plant.

To insure maximum continuity in service, some stripping companies have found dual transformer banks, either with sufficient capacity to carry the load, a paying investment. Good switch houses materially reduce the hazards in serving pit equipment and at the same time speed the process of changing cables. Some companies have gone to the use of three-phase field transformers instead of the



usual three single-phase units. They are a little cheaper and eliminate a lot of what might be sloppy wiring. Moreover, two single-phase transformers will not supply power from a Y circuit. Adequate lightning protection is a must and should include capacitors to reduce the steepness of the wave front.

Proper grounding protection eliminates high-voltage shocks and thus practically removes the possibility of severe electrical injuries or fatalities in stripping work. An ungrounded system, however, offers some advantages over grounding and is safe *provided* all equipment is solidly grounded. A solid-ground system, on the other hand, has the disadvantage of raising the voltage of any equipment in accidental contact above the true ground voltage unless such equipment has a very low-resistance ground. Consequently, to get the advantages of both the others, many operators use the impedance system, which usually maintains potential between frame and ground at less than 100 volts in case of a fault in cable or motor. This system, using a reactor in the solid neutral, permits using a ground relay to open the main oil circuit breaker. Other protective devices for men and machines are ground-tripping oil circuit breakers on each active circuit, disconnects to kill lines being worked on and weatherproof housing for cable joints.

The efficiency-promoting effects of stable line conditions has been reflected in increased attention to power-factor correction in recent years. Without regulation, line voltage may fluctuate as much as 10 percent above and below normal. Capacitors are one method of improving power factor. A newer one functions by the introduction of a special exciter in the synchronous motor-field circuit to vary the excitation in accordance with the varying load. A recent test demonstrated a reduction of approximately 70 percent in line-voltage fluctuations through the use of this equipment.

MODERN COAL PREPARATION

A WELL-PREPARED coal possesses, among others, the following major characteristics:

1. Low impurity content—as low as economically feasible considering cost of preparation and value of such preparation to the consumer. It is possible to spend more money in achieving an extra reduction in impurity content than is warranted by the added value to the customer.

2. Correct size for the job.

3. A high degree of uniformity in both impurity content and sizing.

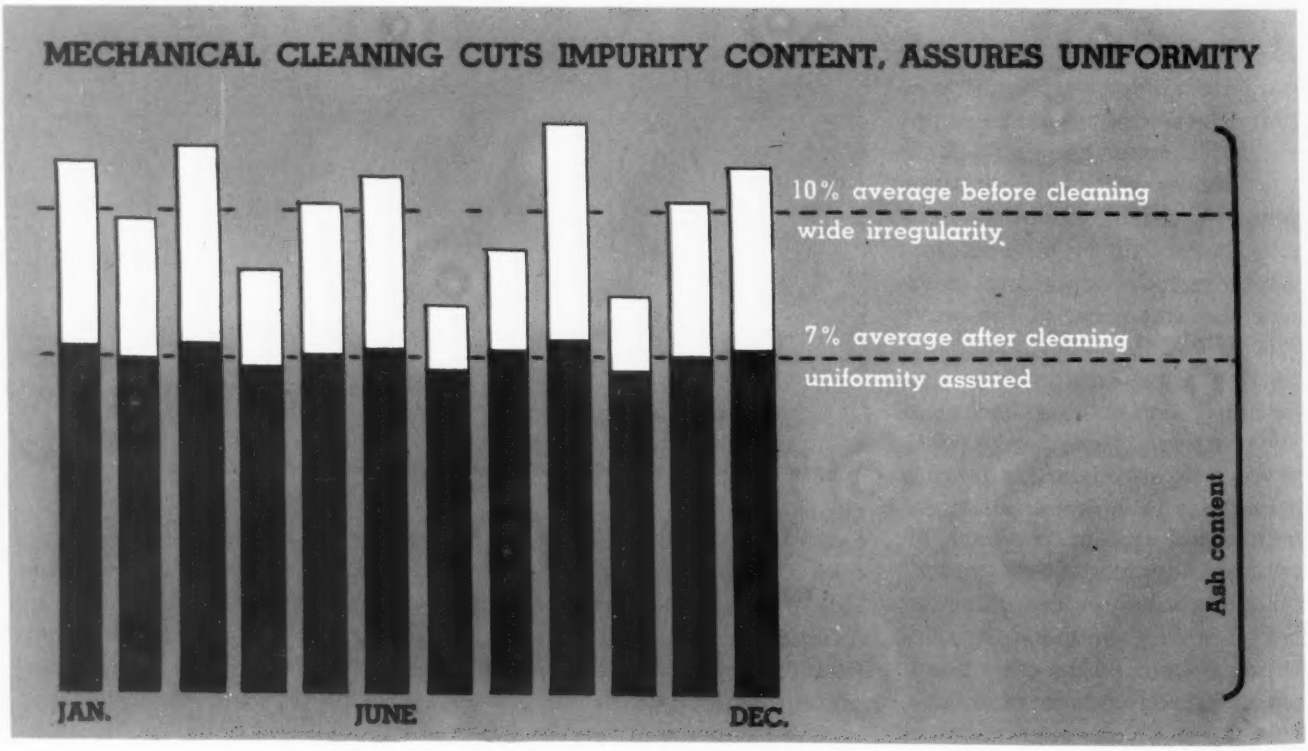
Additional desirable characteristics are freedom from excess surface moisture, freedom from dust and freedom from tramp iron and other matter that might interfere with equipment operation.

Along with providing these and other advantages, the preparation system should function with the minimum expenditure, both for facilities and manpower, and should recover the maximum possible tonnage of salable coal. Coal thrown onto dumps brings in no revenue and raises the cost of the remainder.

Preparation has as its primary objective improvement of quality or value to the consumer and consequently cannot be considered ordinarily a direct cost-cutting activity, although modern equipment can reduce the expenditures in certain phases of preparation. In the main, the operator benefits by better acceptance of his product and a consequently improved competitive position and better running time. If he can get a higher price—and this is not a possibility to be dismissed lightly—so much the better. Modern preparation certainly improves his chances.

Many factors influence the preparation problem and consequently the methods and equipment to be installed. But modern practice recognizes certain critical considerations and with due regard to the variations in governing factors some of these are discussed in the following material.

Cleaning to New Standards



A number of coals can be produced clean enough for market acceptance with perhaps only hand-picking of the larger sizes. But with the spread of mechanical mining underground, the number is shrinking while at the same time the problem is being aggravated at others less favorably situated. The mechanical cleaner is being increasingly called upon for the answer. It can function on sizes smaller than can be cleaned efficiently by hand. It can go farther in impurity reduction on most sizes. And it assures a high degree of uniformity. The latter, incidentally, often is more important than max-

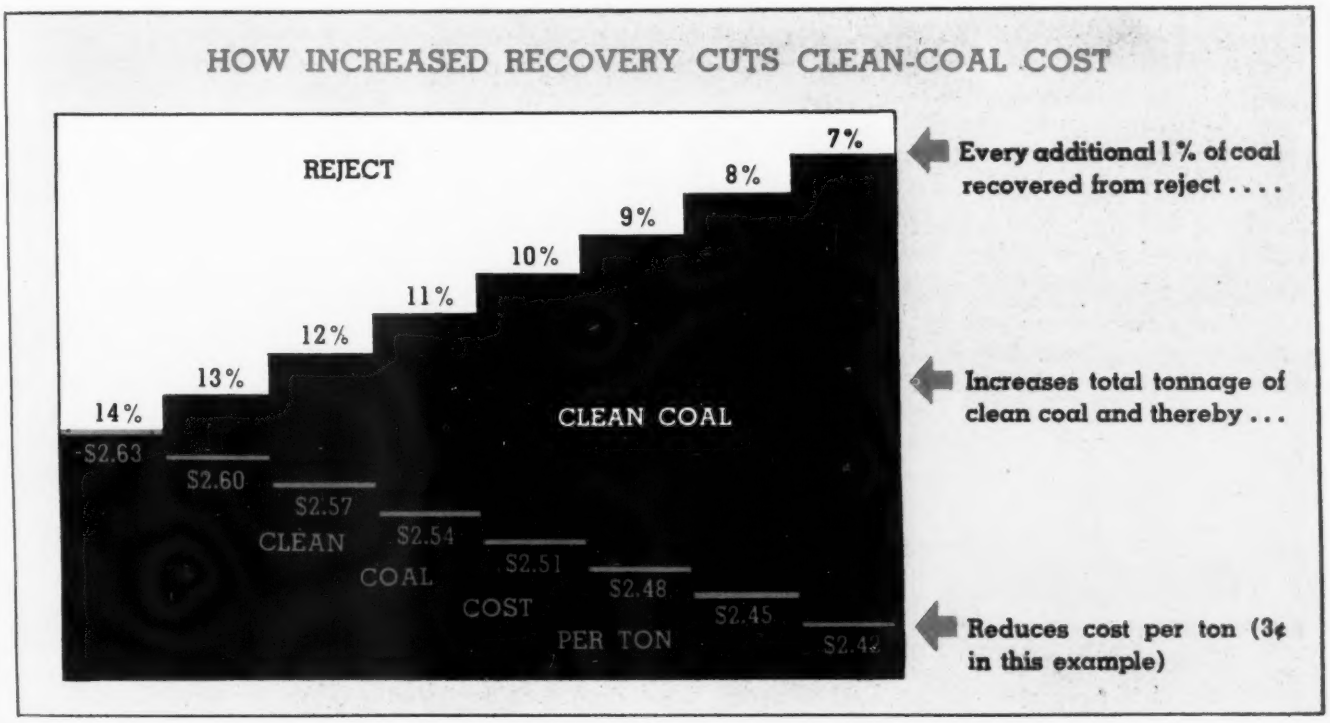
imum elimination of impurities.

It is possible in some instances to extend the use of mechanical cleaning equipment to sizes normally hand picked and thus conserve labor. Washing up to 6- or 8-in., for example, may, if feasible, eliminate two, four or six pickers with savings of $1,200 to $10,000 annually, depending upon rates and working time.

While mechanical-cleaning equipment is inherently efficient, results nevertheless are improved by various auxiliaries and proper operation. Thus, a uniform feed, either in rate, ash content or moisture, tends to better the performance of the cleaning units. For instance, spraying raw coal as necessary to even out moisture content has been found to improve the performance of air tables at some plants. And while installation is governed by the prospective benefits under the specific conditions at specific plants, some operators have found large mine-run blending bins worth the money in evening out feed to mechanical cleaning units as well as the impurity content of said feed.

Where mine-run contains considerable quantities of rock, capacity of the larger, more costly main-plant cleaning units and their results have been improved by installation of precleaning equipment, especially where everything is broken to a specified upper limit and mechanically treated. While the precleaning can be done by hand, mechanical equipment normally conserves manpower and cuts cost.

Increasing Coal Recovery



Economical coal preparation not only involves a quality product but also minimum loss of salable product to the refuse. Such losses can occur through inaccurate separation in cleaning, through dumping deduster fines, slurry and the like or through other wasteful practices. Fines, however, often are so high in impurities as to be unmarketable, even after cleaning, while in other cases they could be cleaned, but at an unprofitable cost.

Losses in dust or slurry alone often aggregate 5 percent or more of the mine-run output. So, if the output was 2,000 tons before cleaning, dust or slurry reject would be 100 tons or more. If it could be sold separately or in combination at, say 75c. or $1 per ton, the loss to the mine would be $75 or $100 daily. While, as stated, cost might prohibit recovery and beneficiation to make such coal salable, the possibilities should not be allowed to go by default where large tonnages are being dumped. Then, there is another factor becoming increasingly important: stream pollution. If tightening of regulations requires treatment of wash water before it is dumped, the operator might well go farther and recover the material, if possible, in a condition which would bring in some revenue.

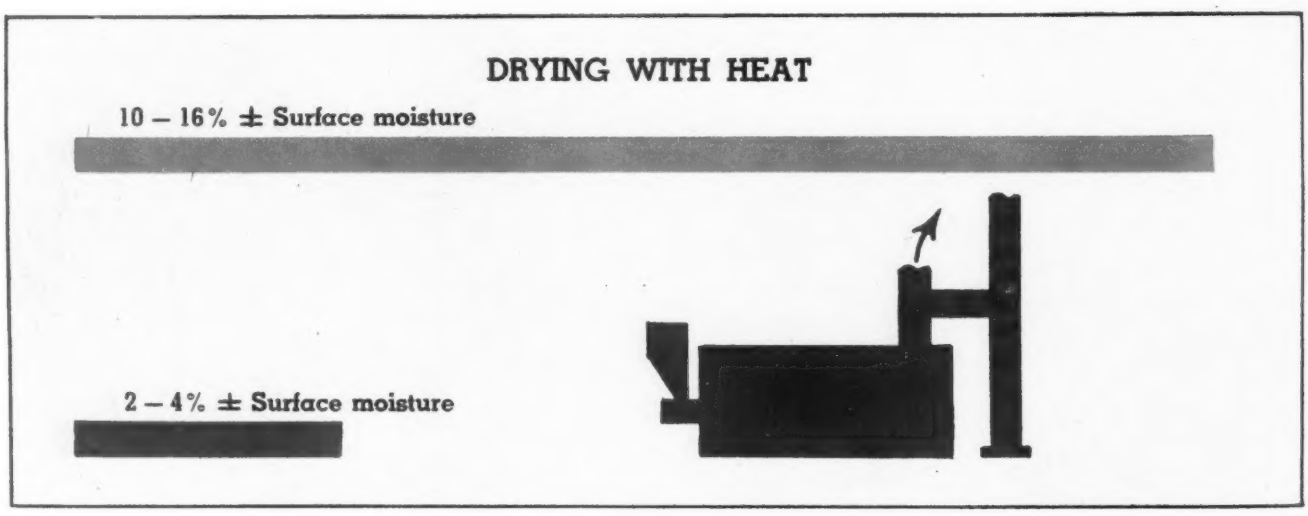
The same element—loss of revenue—dictates the most efficient operation of cleaning equipment to keep good coal out of the refuse. Where tonnages are sizable, improving the efficiency of cleaning and thus reducing coal loss might easily return the investment in the plant in a few years. In addition, there is the possibility of increased

tonnages from sources not normally considered; for instance, mine refuse. If such refuse must be brought out and should contain substantial percentages of top, rider or other coal, it may pay to put in salvage equipment. Several companies have done so with good results.

Besides such measures as stepping up cleaner efficiency, reclaiming and treating fines and salvaging coal from mine refuse, loss of coal can be reduced in several other directions. One is controlling crushing to keep the output of fines that might wind up in dust and sludge as low as possible. Another is crushing and cleaning pickings and cleaner middlings or refuse—a growing practice. In several cases, operators with equipment less susceptible to adjustment for close separation or with large percentages of material near the cleaning gravity have found special middlings or refuse-treating equipment, a valuable investment.

Screening also can result in substantial losses in coal values. Thus, dewatering screens with enlarged slots or openings can let large quantities of material through to the slurry. Coarse-coal screens in bad condition also can pass coarser coal commanding a higher price into the next smaller and lower-price fraction. Along the same line, crushing to make nut, pea, stoker and other smaller prepared sizes should be conducted to obtain the maximum yield of the coarser fractions and thereby raise the average realization.

Drying With Efficiency

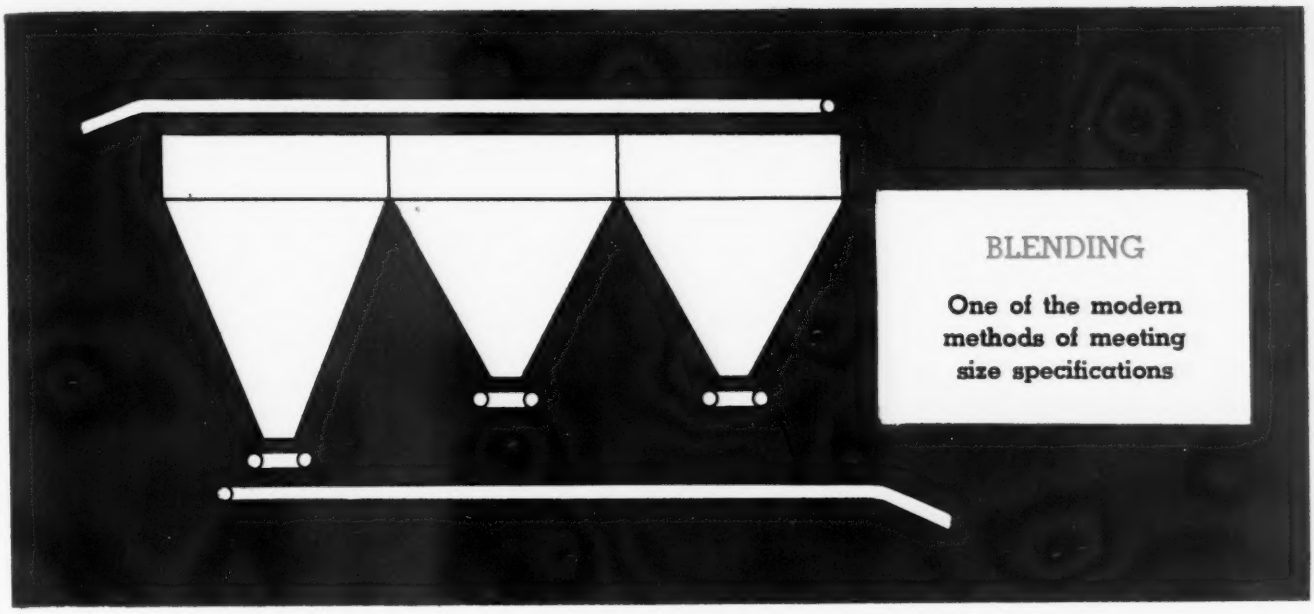


Washing coal frequently introduces not only the problems of added moisture but also the problem of unloading and handling the coal in freezing weather. If the percentage of moisture is not a major factor, the problem of freezing can and is being handled by the application of such materials as calcium chloride.

Dewatering, depending upon the results desired, can be accomplished by high-speed shaker or vibrating screens, centrifuges, thickeners and filters, and heat-drying equipment. Where maximum reduction of surface moisture is desired, the heat dryer is the usual choice, since it is capable, if necessary, of eliminating practically all the surface moisture, although such elimination seldom is carried that far. The usual practice is to go down to 2 or 3 percent, more or less. A frequent practice making for higher efficiency is the use of centrifuges or other mechanical drying equipment in connection with heat-drying units, the latter accomplishing the final step.

Getting Results in Sizing

The importance of accurate sizing in terms of increased realization to the producer already has been alluded to. Size also is important in many types of coal use and has led to a major increase in crushing, dedusting and mixing in recent years, all designed to provide a more efficient fuel for the customer's equipment. With this increase in sizing, the vibrating screen has played an increas-



BLENDING

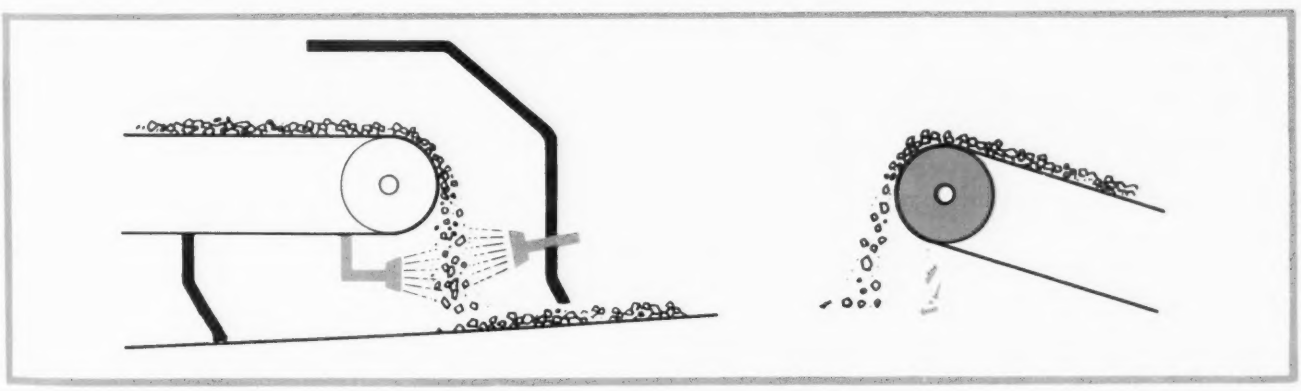
One of the modern methods of meeting size specifications

ingly important role because of its relatively higher efficiency and accuracy, especially in handling the smaller grades. In addition to vibrators and other screens, dedusting also is done with aspirating or other types of air equipment in which the separation is performed by an air current.

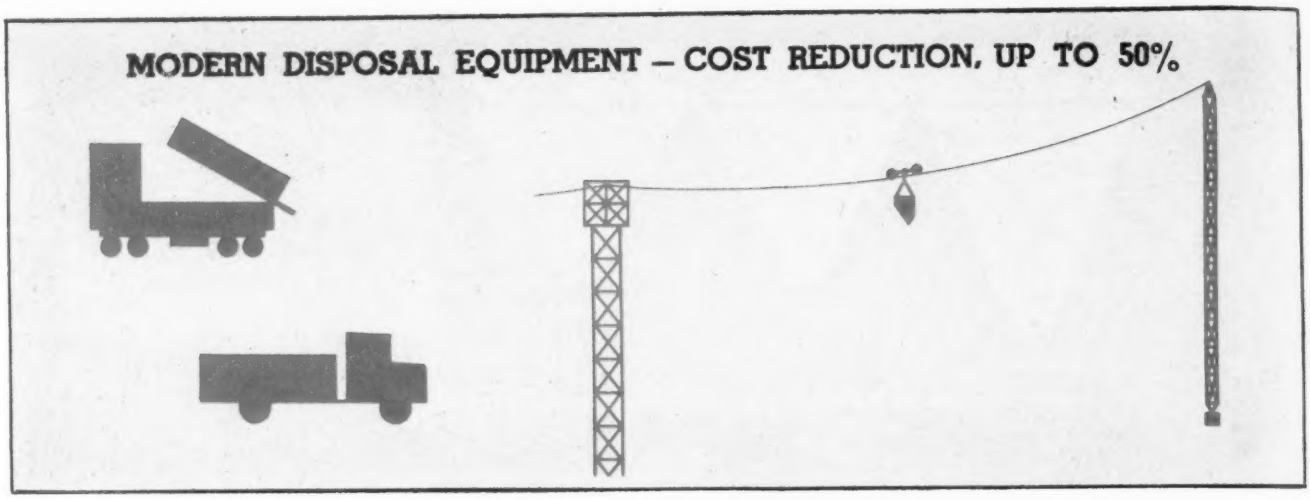
Where screens are used for dedusting, several operators encountering damp or moist coal have gone to water dedusting, using sprays with vibrators to facilitate the separation of the fine material. Classifiers of various types also are being installed in larger numbers as a means of accomplishing a separation, with or without some degree of cleaning, as an incident in mechanical cleaning.

"Prescription mixing" is a late manifestation of growing appreciation of the importance of proper sizing to the user. Such mixing ordinarily involves the use of several storage bins for the various sizes with proportioning feeders for setting the percentage of each fraction in the final product and maintaining that percentage as long as it is loaded. High accuracy in the product and ability to change at will to fill orders have been found well worth the cost by many producers.

Insuring Customer Satisfaction



Although coal may be well cleaned, well sized and highly uniform, the maximum degree of customer satisfaction may not have been attained if the preparation process lets iron through or if the coal is dusty and disagreeable to handle. Consequently, dustproofing has shown a major growth in recent years and consumers, especially in the domestic group, have evidenced an undoubted willingness to pay for this added convenience. Where the cleaning equipment does not remove iron automatically, tramp-iron removal equipment is being installed in increasing volume to prevent damage to coal-burning units and gripes from users. Even where cleaners are employed, some operators precede them with tramp-iron magnets or pulleys to prevent damage to screens, gates and the like and interruptions of operation while such damage is being repaired and the stray iron removed.



Low-Cost Refuse Disposal

If the refuse-disposal system at a coal mine involves considerable hand labor, its cost can go up to 25, 30 or more cents per ton. And if the equipment is cumbersome or inadequate, the opportunities for employing what otherwise would be a low-cost dumping location may be limited, still further handicapping the property in getting rid of waste material economically.

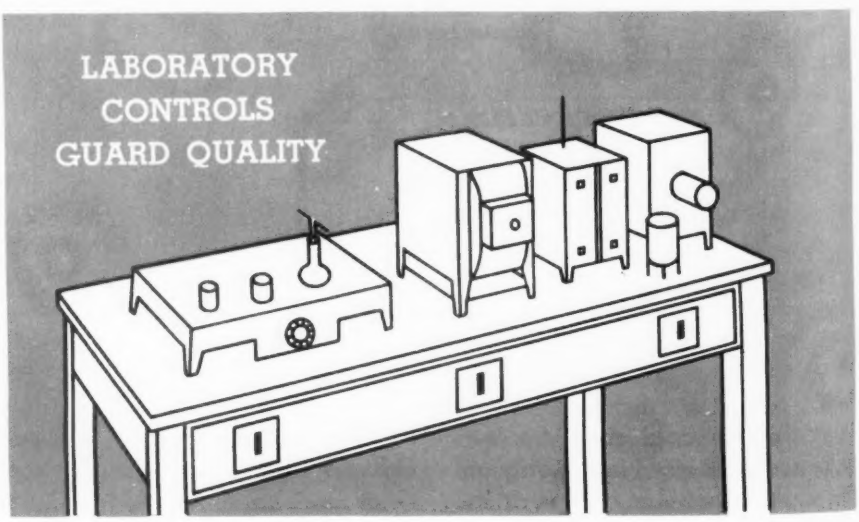
Modern equipment for refuse-disposal includes the motor truck, the self-propelled self-dumping larry and the aerial tramway. Special bodies with drop end gates which can be used as spreaders and blades on the front for road making, smoothing and other operations increase the flexibility of truck disposal and reduce cost. The final choice of the equipment and method to be used will depend upon a thorough analysis of local conditions, but all modern disposal installations normally can cut the cost in half – a saving of 10 or more cents per ton, depending upon conditions and the methods previously employed.

Controls for Efficient Preparation

Modern preparation is founded on modern equipment and methods. But that is not all. Even with the best of equipment and methods, working in the dark is not conducive to maximum efficiency. Consequently, a good laboratory and its accompanying sampling and testing equipment – and staff – is a necessary adjunct to any modern preparation installation.

The laboratory and staff provide these very desirable types of information:

1. The extreme possible variations in the plant output.
2. Data for making adjustments to minimize the variations and come closer to obtaining a product which is continuously within the established range of quality.
3. A record of shipments made.



This record is invaluable in tracing complaints, handling them and facilitating adjustments, if any should be necessary.

Sampling methods and laboratory facilities are subject to considerable variations, but whatever its nature a good control system pays dividends in better coal and increased consumer satisfaction.

MODERN MINING SCORE SHEET

COAL'S opportunities in the fields of cutting cost, raising quality and promoting safety still are good—in fact, excellent—thus auguring well for the future. The preceding pages in this issue of Coal Age have analyzed many of these opportunities. For the convenience of officials and operating men, they are summarized in the following material—a score sheet on modern mining.

☐ **Is mechanical mining the practice underground?** Cuts cost up to 50c. or more per ton ..... p. 82

☐ **Is mechanical cleaning employed?** Reduces impurities, assures a high degree of uniformity ..... p. 82

☐ **Are all safety principles in use?** Can cut accident cost half or more and raise output per man ..... p. 82

OPENING—DEVELOPMENT

☐ **Do openings and mining plan provide for downhill operation and full retreat?** Can save 5, 10 or more cents per ton ..... p. 84

☐ **Is skip or slope hoisting employed or contemplated?** Cuts horsepower one-third to three-fourths ..... p. 84

☐ **Is slope-sinking, tunneling and entry and gangway work mechanized?** Double or triple speed; substantially reduced cost ..... p. 84

MECHANICAL MINING

☐ **Does capacity of auxiliary equipment and operations match that of loading machine?** Substantial investments warranted to assure higher production and lower cost ..... p. 86

☐ **Has crew size been studied to see if it is correct for conditions and equipment?** Right crew size increases tonnage, cuts cost .. p. 87

☐ **Are sufficient working places provided per machine territory?** Increases both unit output and output per man ..... p. 87

☐ **Are places cut as wide and deep as possible to raise tons per fall?** Boosts unit output and individual productivity ..... p. 88

☐ **Are the biggest possible cars being used?** Savings in actual practice aggregate 10c. or more per ton ..... p. 89

☐ **Is car-changing distance as short as possible?** Loaders and men produce substantially more ..... p. 89

FACE PREPARATION

☐ **Is highest-capacity cutting and drilling equipment used?** Conserves manpower, reduces cost ..... p. 90

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MODERN MINING SCORE SHEET

- [ ] **Are treated or alloy bits used?** Production two to six times per-point with less power, lower maintenance and lower cutting cost. p. 90
- [ ] **Is the best drilling pattern and breaking medium employed?** Can cut explosive cost in half, raise coarse-coal yield and boost loader output ..... p. 90
- [ ] **Are mechanical methods being employed for handling partings and drawslate?** Cut cost materially ..... p. 92

TRANSPORTATION

- [ ] **Are modern hoisting auxiliaries employed?** Raise output, conserve manpower ..... p. 93
- [ ] **Are big, modern cars in use?** Raise efficiency and cut cost ..... p. 93
- [ ] **Are modern locomotives employed for higher efficiency?** Greater output and lower cost. p. 93
- [ ] **Do haulage roads conform to modern standards in construction and grades?** Can increase capacity of system 10 percent or more with less equipment, labor and power. pp. 95, 96
- [ ] **Are modern haulage controls employed?** Increase output, conserve manpower and promote safety ..... p. 96
- [ ] **Has conveyor use been investigated for certain transportation functions, especially in low coal?** Saves rock work aside from other benefits ..... p. 97

POWER SUPPLY

- [ ] **Is main a.c. substation near the load center?** ..... p. 98
- [ ] **Is highest possible a.c. distribution voltage, such as 4,000, employed, with ample-sized conductors and metering of major loads?** Saves copper and current and raises productive efficiency ..... p. 98
- [ ] **Is ample power-factor corrective equipment employed?** Reduces the power bill ..... p. 98
- [ ] **Is modern lightning protection installed to prevent damage and interruptions** ..... p. 98
- [ ] **Is complete ground-detection equipment employed for safety and low maintenance?** p. 98
- [ ] **Are d.c. substations close to load centers?** Saves copper, keeps voltage up ..... p. 100
- [ ] **Is ample feeder capacity installed, with ample bonding and auxiliary returns?** Keeps voltage up, conserves energy ..... p. 100
- [ ] **Is sufficient metering equipment on hand for regular check of face voltage to facilitate keeping it up to par?** ..... p. 100
- [ ] **Is sectionalizing and load-distributing equipment installed for protection and most efficient use of substation equipment?** .... p. 100

VENTILATION

- [ ] **Are modern fans employed?** Cut horsepower one-half to two-thirds ..... p. 102
- [ ] **Is airway capacity ample?** Savings add up thousands annually ..... p. 103
- [ ] **Is leakage reduced to the limit?** A 40-percent leakage results in a power loss of approximately 66 percent ..... p. 103
- [ ] **Is the principle of one-way air travel made use of?** Power savings can reach 80 percent ..... p. 104
- [ ] **Is proper splitting the practice?** Cuts power substantially ..... p. 104

DRAINAGE

- [ ] **Is all possible water kept out of workings?** No power, pumps or labor required ... p. 105
- [ ] **Are siphons, ditches, tunnels and boreholes used where possible?** Save pumping .. p. 105
- [ ] **Are discharge lines kept short by boreholes or other shortcuts to the outside and as large in size as possible?** Reduces pumping, power and labor ..... p. 106
- [ ] **Is modern equipment, such as deepwell turbine units, employed?** Savings can run up to thousands annually ..... p. 106
- [ ] **Is automatic control equipment employed where possible to conserve manpower and cut cost?** ..... p. 106

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MODERN MINING SCORE SHEET

- [ ] **Is acid-resisting equipment employed where possible?** Saves in maintenance labor and cost of replacements ..... p. 107

MAINTENANCE

- [ ] **Do inspection and report systems show accurately machine condition and where preventive repairs can avert major breakdowns?** p. 108
- [ ] **Are qualified repairmen stationed in each working-section** ..... p. 108
- [ ] **Is the best in lubricants, equipment and methods employed?** ..... p. 108
- [ ] **Have bosses and repairmen had instruction in their jobs and in maintenance methods?** p. 108
- [ ] **Are adequately equipped section shops installed to supplement main shop and general repair facilities?** ..... p. 108
- [ ] **Are special trucks and tool cars, with complete sets of tools, provided for quick repair work away from shops?** ..... p. 108
- [ ] **Are parts which fail studied and redesigned for longer life?** ..... p. 108
- [ ] **Are spare producing units provided to permit overhauling without reducing production?** ..... p. 108
- [ ] **Are assemblies kept repaired for substitution in equipment units as a whole to reduce replacement time and other delays?** ... p. 108
- [ ] **Are modern insulation and best rewinding methods used on armatures?** ..... p. 108
- [ ] **Are sufficient instruments on hand to facilitate electrical work?** ..... p. 108
- [ ] **Are tires filled by arc welding?** Savings range up to 50 percent ..... p. 108
- [ ] **Are alloy steels used for longer life?** .. p. 108
- [ ] **Is metallizing and welding equipment installed to facilitate repair and reclamation, protective spraying, etc.?** ..... p. 108

SUPPLY SERVICE

- [ ] **Do receiving and storage facilities include adequate platform, shed and rack equipment and cranes or derricks for handling?** p. 110
- [ ] **Is a perpetual-inventory system installed?** p. 110
- [ ] **Are auxiliary storerooms and supply depots installed at strategic locations underground to facilitate repairs with minimum loss of time?** ..... p. 110
- [ ] **Are good, safe oil and powder houses installed, with modern equipment for distributing explosives and lubricants?** ..... p. 110
- [ ] **Do maintenance reports show how parts are used or misused and what items should be kept in working sections?** ..... p. 110
- [ ] **Is equipment well standardized to reduce parts stock and facilitate maintenance?** p. 110

SAFETY

- [ ] **Is management sold on the benefits of safety?** ..... p. 112
- [ ] **Does the record system show accurately accident causes and costs?** ..... p. 112
- [ ] **Has a strong, well-staffed safety organization been set up?** ..... p. 112
- [ ] **Has supervisory, employee and community cooperation been enlisted?** ..... p. 112
- [ ] **Has a complete code of safety standards and practices been adopted?** ..... p. 112
- [ ] **Have supervisors and men been trained in safe practices, first-aid and mine rescue?** p. 112
- [ ] **Are mine and plant kept in the best and safest physical condition continuously?** p. 112
- [ ] **Is ventilation good?** ..... p. 112
- [ ] **Are the recognized precautions against explosions being used?** ..... p. 112
- [ ] **Do men understand roof and how to handle it?** ..... p. 112

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MODERN MINING SCORE SHEET

- ☐ **Is systematic timbering employed?** ..... p. 112
- ☐ **Are recognized precautions in haulage employed?** ..... p. 112
- ☐ **Are electrical equipment and practices safe?** p. 112
- ☐ **Are safe measures employed in handling explosives, lubricants and other inflammable or explosive materials?** ..... p. 112
- ☐ **Is ample fire-fighting equipment on hand?** p. 112

STRIPPING

- ☐ **Is water kept out of the pit by ditches, dams and other natural-flow facilities?** Saves pumps, power and labor ..... p. 114
- ☐ **Does pumping equipment provide the flexibility necessary for adequate pit dewatering?** ..... p. 114
- ☐ **Has overburden preparation been studied for higher efficiency?** Can increase shovel yardage 10 percent or more and cut maintenance substantially ..... p. 115
- ☐ **Are modern drilling units employed to cut cost and assure better shooting?** ..... p. 115
- ☐ **Have sufficient auxiliary equipment units of the right type been installed to facilitate shovel operation?** Saves time for stripping and loading ..... p. 115
- ☐ **Is the biggest possible dipper or bucket being employed?** Can increase capacity up to 50 percent ..... p. 115
- ☐ **Have the possibilities of new shovel controls been investigated?** Can increase yardage as much as 10 percent ..... p. 115
- ☐ **Is the biggest possible haulage equipment employed?** Saves labor and maintenance. p. 117
- ☐ **Have the possibilities of combination rail and truck haulage been studied for lower cost?** ..... p. 117
- ☐ **Are new fuels being used?** Increase power and cut maintenance ..... p. 117
- ☐ **Are the best possible truck roads being built?** Can increase haulage capacity 10 percent or more and cut maintenance ..... p. 117
- ☐ **Do maintenance methods stress inspection, preventive repairs, good lubrication and supplies close to points of need?** ..... p. 118
- ☐ **Does the electrical system provide for proper lightning protection, voltage stability through power-factor control and proper grounding for the safety of men?** ..... p. 118

COAL PREPARATION

- ☐ **Is mechanical cleaning employed or have its possibilities been investigated?** Better impurity elimination, greater uniformity and, in some instances, less labor ..... p. 120
- ☐ **Have provisions been made for evening out feed and its characteristics to mechanical cleaners?** Can improve results ..... p. 120
- ☐ **Is proper provision made for the recovery of fines or have the possibilities been studied?** Extra revenue often substantial ..... p. 121
- ☐ **Are other coal losses prevented by such means as salvage from mine refuse and pickings, re-treatment of cleaner middlings and refuse, and keeping screens in good condition?** ..... p. 121
- ☐ **Have the possibilities of chemical freeze-proofing been studied?** ..... p. 122
- ☐ **Have the possibilities of new drying equipment, both mechanical and heat, been investigated?** ..... p. 122
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- ☐ **Have the possibilities of new mixing and blending equipment been studied to better meet sizing requirements?** ..... p. 122
- ☐ **Is dustproofing and tramp-iron-removal equipment installed?** ..... p. 123
- ☐ **Have the possibilities of modern truck, larry or tramway refuse-disposal been investigated?** Can cut cost up to 50 percent .. p. 124
- ☐ **Are modern preparation controls employed?** p. 124

Disposal of Government War *Plants and* Equipment

In the last four years, the Federal Government has spent over fifteen billion dollars on war plants—two-and-one-half times as much as was spent by private investors.

Of this fifteen-billion-dollar government investment, about one-third has gone into facilities for the manufacture of aircraft and for ship construction and repair; another third has gone into plants for production of combat ordnance; and the remaining third has gone into a variety of facilities for making synthetic rubber, metal products, machinery, and miscellaneous equipment.

Most of these plants are in industries that are expanded far beyond peacetime requirements. Furthermore, their convertibility to other civilian uses will, in many cases, be complicated by their specialized equipment and layout, by their tremendous size, and by their uneconomic location. At the moment, it looks as if roughly one-third of the government-owned plants and equipment can be converted fairly readily to peacetime operation, and will, therefore, be easily disposable to private enterprise.

The discovery of unsuspected uses for war plants and equipment may well raise the disposable proportion to one-half or more. The government, at the end of the war, may own about one-eighth of the commercially-usable industrial capacity of the country. It will be by far the largest owner of machine tools; it will own enormous aluminum capacity, magnesium capacity, many miles of pipe lines, and more ships than the entire private shipping industry.

What the government does with its war plants will have a profound effect on the free enterprise system and on all workers, employers, investors, and consumers who have a part in that system. If this problem is handled badly, we may find ourselves enmeshed in a trend toward monopoly and government operation of industry. If the problem is handled well, we shall have taken a big step toward freedom of action in a competitive society, toward full opportunities for business enterprise, toward well-paid productive jobs for workers, and toward a higher standard of living for us all.

Recently, three important events have signalled encouragement. They are the report of Senator George's Committee, the Baruch report, and the report of Senator Truman's Committee. These reports are noteworthy for their competent sizing up of a complex problem, for their recognition of the major responsibility of government in making a successful transition to peace, for their insistence on wise policy and good administration, and for their genuine concern that our productive powers be given full opportunity in a free private enterprise system. These reports agree on basic principles and many specific lines of action. There are, however, important areas of policy formation, organization, and procedure—especially in regard to plant disposal—which remain to be blue-printed.

In formulating the policies and practices to be followed in dealing with government war plants, our major goal must, of course, be a high level of production and employment in private business after the war.

Government operation in competition with private employers and privately-employed workers will not be desirable because it will make investment unattractive to private capital and will limit opportunities for private employment. On the other hand, sales to private buyers which result in increasing the concentration of industry will also be undesirable. We must use this opportunity to strengthen the competitive enterprise system and to move away from, not toward, the concentration of economic power in either public or private agencies.

To accomplish these objectives, a program of action such as follows will be necessary:

1. An adequate reconversion organization will be needed in the government, but its powers and responsibilities should carefully be defined by Congress. Fortunately, an able Administrator of Surplus War Property already has been appointed. It will be essential for him to work in closest cooperation with Congress and with the Armed Forces and other executive agencies. The Office of War Mobilization, and ultimately the President, must be responsible for seeing that the Surplus War Property Administration is not sidetracked by the operating agencies and is not dominated by their sheer size. Funds must be supplied generously to the Surplus War Property Administrator, so that he can set up an organization adequate to cope with this huge and complex job. Business, too, must be generous in loaning top-flight executives for postwar government service.

2. One of the first acts of the Surplus War Property Administration will have to be to assemble a complete inventory of government war plants and equipment, to make possible the planning and control of the disposal process, and to form the basis of catalogues of property available for sale.

3. Cooperation between the executive and legislative branches of the government will be needed to develop at least tentative plans with respect to matters of public policy which are of special importance to a successful transition to peace. Among these matters are the size of the military establishment to be maintained in time of peace, the stand-by facilities and reserves of materiél necessary for our security in case of future war, and our policy regarding import and production of synthetic rubber and other critical and strategic materials.

4. The Surplus War Property Administrator should

obtain from the Armed Forces, acting under congressional directives, specification of those plants which are needed to supply our peacetime Army and Navy and to provide the essential reserve capacity in case of war.

5. The Surplus War Property Administrator should select certain war plants as depots in which to store the huge surpluses of inventories and equipment which will have to be removed from private and government-owned factories in order to make possible their conversion to civilian use.

6. Those plants which are not desired by the Army or the Navy, which are not needed for storage, and which clearly will be unsuitable for peacetime utilization should be scheduled for dismantling and disposal piecemeal.

7. The two or three billion dollars' worth of government facilities intermingled with private plant should receive attention with a view to early sale, temporary continuance or use under lease, or early removal.

8. The various plants and pieces of equipment available for sale to private business should be classified conveniently, catalogued, and advertised to prospective buyers or lessors. Before the Surplus War Property Administrator offers, for private sale, plants and equipment not desired by the Army or the Navy, he should ascertain whether the plants or equipment are desired by other branches of the government or by public corporations such as the T.V.A.

9. Whenever property can be sold at prices approximating depreciated reproduction cost, that will be by far the best solution. Generous time-payment terms should be offered. In many cases the government may be unable to sell the property for reproduction cost less depreciation, for the simple reason that no one would think of reproducing it. The property may already be partly obsolete or, because of its size, location, or other characteristics, may only be moderately well suited for commercial use. This should not prevent the government from selling it, provided a price which fairly represents the worth of the property can be obtained. The best test of that worth is the price produced by active bidding under favorable market conditions.

10. When property cannot be sold at a fair price, temporary leases with options to buy should be employed to get the facilities into productive use. This should not, however, be done on terms which would cause unfair competition or create clearly excessive capacity in an industry. And the lease must be temporary; it must not be the means to prolong government control or ownership.

11. The government should offer the strongest possible resistance to local groups or industry groups seeking subsidies for continued operation of war properties. Subsidies will burden the Treasury and lead to inefficient use of resources. They will be justified only to maintain facilities needed for national security.

12. The plants and equipment offered for sale and lease should include sufficient quantities in small enough lots to satisfy the demands from small business. The war has tended to concentrate production in larger plants. After the war, we should seek a wider distribution of the government war facilities.

13. Insofar as possible, war buildings and equipment should be offered for sale in units which can be purchased by businesses in peacetime industries. Many of these industries have had to get along during the war without adequate replacement and expansion, and will be ready to buy if they are able to get what they want from the government. This is a particularly desirable market for surplus government property since these industries are, for the most part, not faced with the problems of excess capacity.

14. Property, such as machinery and other movable equipment, which is in excess of our domestic requirements or is more urgently needed by other countries, should be exported. We shall need, and can take, large supplies of raw materials in return.

15. Property which is not needed by the Armed Forces, which cannot be sold or leased on terms which would be fair to competing plants, which cannot be dismantled and distributed piecemeal, and which cannot be sold abroad, should be scrapped as soon as its non-disposability is apparent. The disposal of war plants should be completed within three to five years.

16. All negotiations for sale or disposal should be matters of open public record. As Mr. Baruch has said, the process must be conducted in a goldfish bowl. This is as much for the protection of business as for the protection of the government.

These courses of action do not include everything that must be done, but they do indicate the general lines along which our surplus war plant disposal must proceed if it is to avoid precipitating needless transition unemployment.

The gravest danger of all will be red tape, intergovernmental conflict, and inadequate administration. It would be a great misfortune for the executive and legislative branches to quarrel over details of organization when they agree on the basic principles to be followed in handling the problem. Obviously, the Surplus War Property Administration must cooperate with Congress and look to it for policy guidance. Just as obviously, the disposal problem will involve great difficulties of administration which must not be complicated by congressional interference. We shall need the best we can get in careful policy making, detailed planning, good organization, and courageous action. This is a matter of vital importance to every American. The stakes are too high to tolerate poor administration or petty politics.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

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THE FOREMEN'S FORUM

Too Much Methane Will Snuff Out a Lamp

If 13 Percent of Methane Is Present It May Act Like Carbon Dioxide and Put Out a Lamp—Methane Will Not Inflame If Oxygen Is Insufficient

ONE CANNOT SAY that any quantity of methane ever spells "safety," but if 15 percent by volume or more of methane is present, a flame within such a body of firedamp will not ignite it, for the nitrogen and argon will occupy 67.20 percent; methane, 15 percent, and oxygen only 17.80 percent of the atmosphere. By this is meant that 15 percent is the quantity of methane that must be present for a flammation to occur, if the light is lifted from below into the gas. This is termed the upper limit for upward propagation, above which methane when ignited in air will be unable to extend its flame upward, but, for this limit to operate, the air, apart from its methane content, must be pure, as in the analysis just stated (see U. S. Bureau of Mines Bulletin 279, p. 42). Probably, the upflow of the products of combustion in a safety lamp is speedy enough to prevent methane from entering the lamp above the flame, especially now that the flame in a modern safety lamp is surrounded by no less a protection than a glass chimney, two gauzes and a bonnet. But if it does enter, the air is so contaminated with the products of combustion that it is by no means pure and that will lower this upper limit.

How Lamp Operates

Gas Flames Prefer to Travel Upward—However, flame does not travel downward as readily as it does upward. It has been found that 12.9 percent or more of the gas will prevent the flame from spreading downward. Methane needs more oxygen (at least 87.1 percent of air) in which to burn when ignited from its top by a flame. The air normally enters a modern lamp through the passages in the admission ring below the flame (see Fig. 1), so the extension of flammation, it would seem, would be downward toward the admission passages rather than upward toward the top of the lamp.

Sometimes a methane blower from the coal face, as in Fig. 2, makes a layer of rich methane along the roof. Or the methane may come from a borehole, as in Fig. 3, and make a horizontal methanous cone in which the lamp is, as one might say, "immersed," and the methanous mixture does not have to accumulate, as in Fig. 2, until it reaches that level. The smaller percentage, 12.9, is therefore the figure to be considered.

Methane Ignites and Suppresses Ignition—Everyone around the coal mines should be keenly conscious of the following fact:

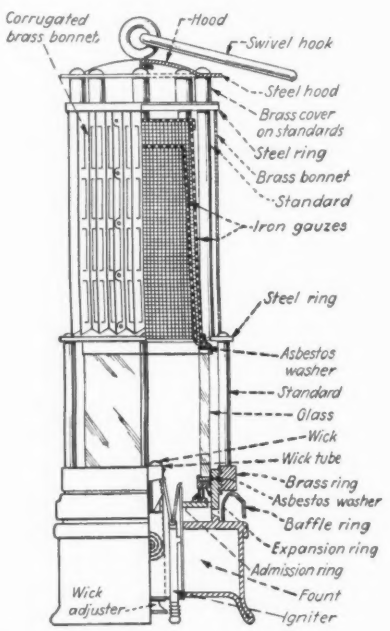


Fig. 1—Modern safety naphtha-burning lamp and its parts. Note four turns in the narrow metal passage by which air is admitted to wick, also the two gauzes and corrugated brass bonnet.

that methane not only can cause an explosion but also can extinguish a lamp if enough of it is present. All of which sounds like a piece of useless information, for the extinction of a lamp will prevent an explosion, but lives have been lost nevertheless from not knowing it or not appreciating the real meaning of that fact.

Extinctive Air—Because of this phenomenon, if a safety lamp goes out, it does not always indicate that the air has too much nitrogen or argon or carbon dioxide but too little oxygen, for methane sometimes really is one of its own "extinctive gases," though never so classed. Any gas, even air or oxygen, is extinctive of a methane explosion if only you have enough of it; this is why we demand lots of air in a mine. If you have more than 95 percent of air, you will prevent methane from exploding, for then you will have less than 5 percent of methane.

What Extinguishes a Lamp

Even well-informed persons are quite likely to ascribe the extinction of a lamp to "bad air," by which they mean an atmosphere containing a high percentage of what we term the extinctive gases—nitrogen or carbon dioxide—when it really has too much, not too little, methane for the small quantity of oxygen present to combine with it. For this reason, the lamp cannot explode it or burn in it. If the highly methanous air and the almost non-methanous air are in distinct but contacting zones, the lamp may get into the highly methanous zone without igniting the gases, and be extinguished.

This can be explained thus: When the source of the methane is below the lamp flame, the atmosphere that is above the flame won't extend flammation, because there is so little methane in it and what is below has so much methane in it that it can't be inflamed and thus exploded. It is a perilous situation; no dependence can be placed on it, a little mixing will upset the nice calculation, and such mixing is quite likely, but, because the light flickers out, we know that sometimes enough mixing for an explosion has not occurred.

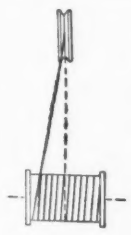
The flame, being in almost methane-free air so long as it burns, shows no easily visible blue cap, at least not one so obvious that it will be noticed. When the lamp is raised or lowered into the methane, the lamp may go out because it so rapidly crosses the definite border line from low

THE RIGHT ANGLE ON *FLEET ANGLES*

Don't let faulty fleet angles deprive you of the satisfactory performance and full time service you can get out of properly aligned wire rope. Excessive fleet angles always result in unnecessary side wear and scrubbing of cable turns—causing distortion, bruising and crushing of individual wires. Drums and sheaves, too, are likely to be irreparably damaged through wearing down of groove walls or flanges. Wherever you suspect excessive fleet angles check the alignment between the first fixed sheave and drum... You can also decrease the angle by increasing the distance between sheave and drum.

Today, wire rope is too precious to gamble with... None is available to private industry... only for government use and high priority war production. Preserve what you have for as long as you can! Get the right angle on fleet angles.

•



FLEET ANGLE is the angle between the center line of sheave and the rope as it moves across the face of the drum—as shown in the diagram. Maximum economical fleet angle should not exceed 1½° for plain faced drums. This is equivalent to 40 feet of lead for every foot of traverse travel to either side of the sheave center line.

For advice regarding your specific problems, address our engineering department.

ROCHESTER *Ropes*

JAMAICA, NEW YORK • CULPEPER, VIRGINIA

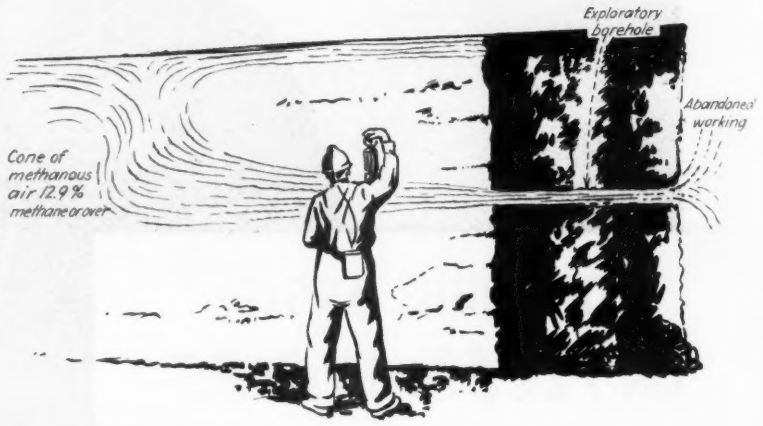


Fig. 2 (Left)—Here methane escapes from roof or runs up face toward roof. Methane newly arrived and not yet diffused. Fig. 3 (Right)—Here a methanous atmosphere is escaping from an abandoned working through a borehole and forms a horizontal cone which ultimately bends upward and spreads on under side of roof.

methane—way down below 5.9 percent—to methane above 12.9 percent. This will occur only when the methane has newly arrived or is still arriving and has had no time or opportunity to diffuse. It is likely to occur when the methane comes from the roof or near roof or travels up the face and spreads near the roof, because methane is able to go downward only by the slow process of diffusion or by the operation of air turbulence, whereas it will travel upward in bulk and diffuse upward also.

On the other hand, methane from a blower or from a borehole often has so much velocity and direction that it will whistle, and it keeps a definite course for a while, forming a horizontal methanous cone surrounded by air that may be methanous in a degree but is still safe if the flame of the lamp is kept strictly within it. The unfortunate fact is that you don't keep the admission ring in this harmless air, and the gas may explode or put out the light—either one. Let us hope it will be the latter, and that you will be wise enough to know why the lamp went out. But now for the danger of not knowing about this extinctive power of high percentages of methane.

Methane in Sheep's Clothing—A certain official, says W. H. Tomlinson, engineer-in-charge, U. S. Bureau of Mines, Norton Station, Norton, Va., in I. C. 7271, "made an examination with a flame safety lamp at a test hole drilled from active into abandoned workings. This official reported that his light had gone out presumably due to 'bad air' (atmosphere deficient in oxygen). The following morning, another official, whose light had also presumably been extinguished by 'bad air' caused an explosion when he attempted to relight his lamp near this test hole. One naturally wonders whether this man knew the effect of the presence of methane or an oxygen-deficient atmosphere, or both, on his safety lamp."

The author of the information circular declares that he "is inclined to believe that this man was totally unfamiliar with the behavior of a safety lamp under these conditions; otherwise he would not have jeopardized his own life as well as the lives of others by attempting to relight his lamp in the presence of explosive gas. Here is an instance in which twelve lives were lost, as the result, presumably, of lack of knowledge of the man who caused the explosion."

At another mine, officials of the company were convinced that their sealed fire area was filled with extinctive gas. "Did not the gas when it was released from the pipe at the base of the stoppings extinguish a safety lamp?" asserted these officials. And they were right, the gas was extinctive, but it was methane in high percentage and not carbon dioxide, nitrogen or argon. A man of more inquiring mind took samples of the gas and found that, mixed with more air, it was highly explosive. The entire sealed area must have been filled with methane from roof to floor, and the officials did not know it, which lack of knowledge might well have jeopardized their lives, the lives of those who were about to unseal the area and the mine itself.

Raising a lamp into rich methane, the flame may spire and get ready to explode. Raising the lamp still higher, it may get into methane so rich that the flame will expire. Methane, though villainously explosive, needs enough oxygen for combustion, just as does any combustible gas.

Perpetual Movement Versus Permanence

The impermanence of most parts of a mine makes expenditures on any but the permanent parts of it imprudent and impossible. A steel company, never extravagant in the construction of its buildings, will spend cheerfully about five times as much per square foot on the structure as the coal company expects to get from the entire operation of a square foot of its coal acreage, and, after the coal is mined, the coal operator can never use that square foot again. It remains to plague him most of the succeeding years with water, subsidence and foul air and with a dead space that increases his transportation costs and compels him to lengthen his roads and electrical cables.

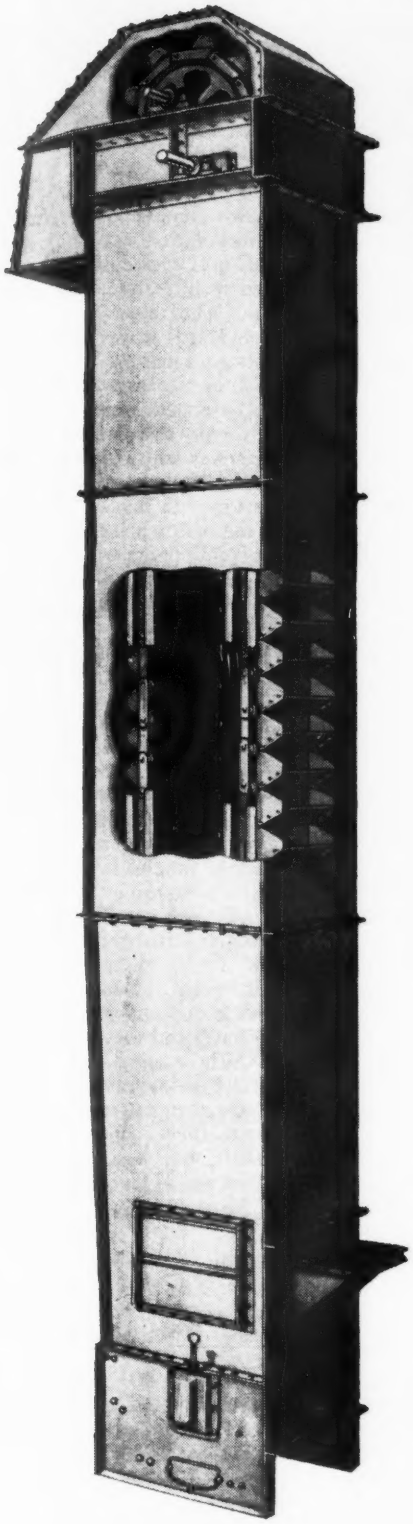
A large plain steel factory building will cost about $1.90 per square foot of floor surface, entirely devoid of equipment for operation. The average value f.o.b. mine of bituminous coal in 1942 was $2.35 including selling expense. Suppose a bed of coal is 4 ft. thick; a column of such coal with 1 sq.ft. of cross-section will weigh $84 \times 4 = 336$ lb. $= 0.168$ ton, which at $2.35 per ton equals 29½c.

All that the operator hopes to get out of that square foot of coal area is a meager 39½c., roughly a third of a dollar. It is easy to see why mines are not constructed with a roof and wall system comparable with that in a steel factory, safe beyond peradventure till the heavens fall. The whole value of the product, present and prospective, is about 20 percent of that for constructing the factory, and this includes the value of the coal in the ground and the producing, cleaning, equipping, administrative and selling costs. No wonder the operator does not have, and cannot construct, a workmanlike facsimile of the steel factory building, much less one of a factory with all the most up-to-date improvements.

The steel building has lavished on it five times as much money per equare foot of floor surface as a square foot of the average mine can be expected to afford to its owner. When the load over that square foot has been mined, nothing can be done except to mine another similar column of coal. The coal factory expands rapidly. When a man produces 5 tons of coal a day, he removes daily almost 30 such columns, which, at 39½c. a square foot, brings exactly $11.85, including all costs.

To compare the safety consciousness and record of the mine foreman with that of the factory foreman, one would, in justice, have to eliminate the falls of roof and the darkness and explosion hazards, and compare the records of the two men by setting down on one side only the minor hazards in mining and on the other side all the hazards of the factory. Yet more men have died in war-plant casualties than are known to have died at the battle front.

KEEP IT ON THE MOVE *with* HOLMES BUCKET ELEVATORS



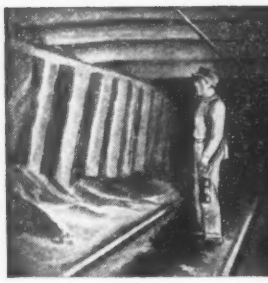
The surest way to avoid bottlenecks in your mine is to keep the material on the move at all times. Holmes bucket elevators are designed to give you long dependable service with a minimum of maintenance and operating costs. They are fabricated to meet your specifications or Holmes' engineering department will design an elevator to suit your requirements.

Holmes also manufacture a complete line of scraper conveyors, dewatering conveyors, lowering spirals, chutes, cast iron and steel bottoms for conveyors and all types of elevator buckets.

ROBERT HOLMES AND BROS., INC.

DANVILLE, ILLINOIS

DESIGNERS AND FABRICATORS OF MINING EQUIPMENT FOR OVER 70 YEARS



STATE-BOARD QUESTIONS

Indiana Firebosses*

Q.—What are the respective advantages or disadvantages of exhaust and blower fans?

A.—Assuming that both are main fans and located at or near the surface, the exhaust fan has the advantage that the haulageway will be in the intake because the air will enter by the haulageway. So the haulage will be conducted in the fresh air, free from methane and coal dust, except such as it can pick up on its way along the mine headings, which usually is not much. The methane and coal dust are liberated in largest quantity at the face, where the coal is broken down and broken again in handling. This methane and dust then go to the return, where there are no trolley lines or broken bonds to make sparks or shots that will set fire to methane or coal dust or anything else likely to ignite either. However, as a rule, much of the methane and dust has to travel through working faces with all kinds of mining equipment before reaching the return, so the statements just made have been oversimplified.

Unfortunately, the return is then a place where officials rarely go and where the mine workers sometimes congregate because they can smoke there without the fumes of their pipes or cigarettes being seen or smelled, for such fumes travel down the return, where there is no one to observe them. The men can hide there quite conveniently until they see the foreman's light and if discovered can bury their cigarettes and say they went there for a proper reason.

With shuttle-car haulage, much dust is formed short of the face because the shuttle car spills coal and breaks it with its wheels and because dust is spread at the transfer point unless plenty of water is used to overcome all these adverse conditions. The use of the shuttle car enables the working face to be located a long distance from the trolley wire and so gives a more favorable condition, but, unfortunately, loading stations, electric blowouts and pneumatic blowouts more than compensate unfavorably for the separation of working face and trolley wire. Being on the intake does not help much when dust is being made in quantity along that air current, as it is when shuttle cars are used.

To get intake air on the haulageway despite the use of a force fan, a door or doors (see illustration) can be put on the main heading, and air can be delivered in behind this air barrier, enabling the air to be delivered in the intake by a blower, or force, fan, but these doors leak and need either mechanical opening-and-closing provisions or close and loyal attendance from trappers, which cannot always be assured. Leakage may be arranged if coal has to be dumped at the foot of the shaft but perhaps the better way is to provide a separate air current with another fan that will remove this dust as fast as it is suspended in the air, and drop it outside the mine.

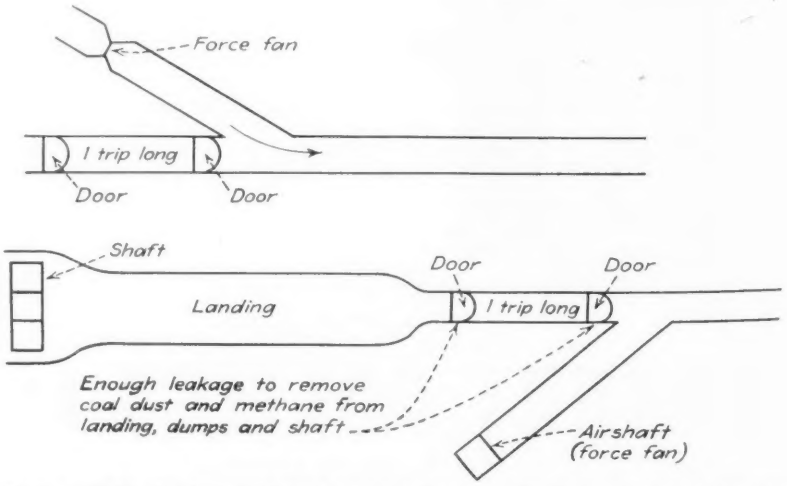
When the air enters by the haulageway, the explosions tend to follow the dusty methane-carrying return, and the men can escape by the usual way of entering and leaving work. This is especially important where the return airway is low, has fallen roof slabs and is hardly fit for travel for any great distance. However, in too many cases the violence of the explosion blows out one or more stoppings, and then both intake and return are so involved in the explosion that the men can escape neither by the old intake or the old return.

With the air provided by a blower, pressure, plenum or force fan, the air comes through the fan into the mine, and the mine locomotives and cars, of course, cannot come that way, so unless the method of entrance is modified as suggested by doors at the mine entrance, the air has to leave by the haulageway amid the dust and methane from the working face.

The advantages of blower-fan operation with haulage on the return airway are small, but there are some. It is easier to rock-dust and inspect a haulageway than a heading that is untracked and perhaps low. For a long time, because of these difficulties, returns in mines ventilated by exhaust fans were not rock-dusted and some for this reason are not rock-dusted today, though they need such treatment far more than the intakes. The return is damper than the intake and in that way safer, and the air, being always moist in the return of a big mine, will be freer from roof falls. The main advantage sought is not in safety but in the fact that (1) there will be fewer falls in the haulageway and so less rock to clean up or interfere with travel, that (2) ice will interfere less with haulage or with the operation of the shaft when there is one and that (3) air conditioning will be more easily provided. Indiana and Illinois have much trouble with shales which keep falling in the moist summer months.

In case of a fire also, if the fan is a force fan, the men will have to leave by the intake. If they do, they cannot come out in cars but must walk or crawl out. They are likely to choose the return, because they know the way and won't be lost and because it is the more direct and certain route. Rarely perhaps they may be right in so doing, but too often such travel is sure death, for the carbon monoxide snuffs out their lives before they can reach the surface.

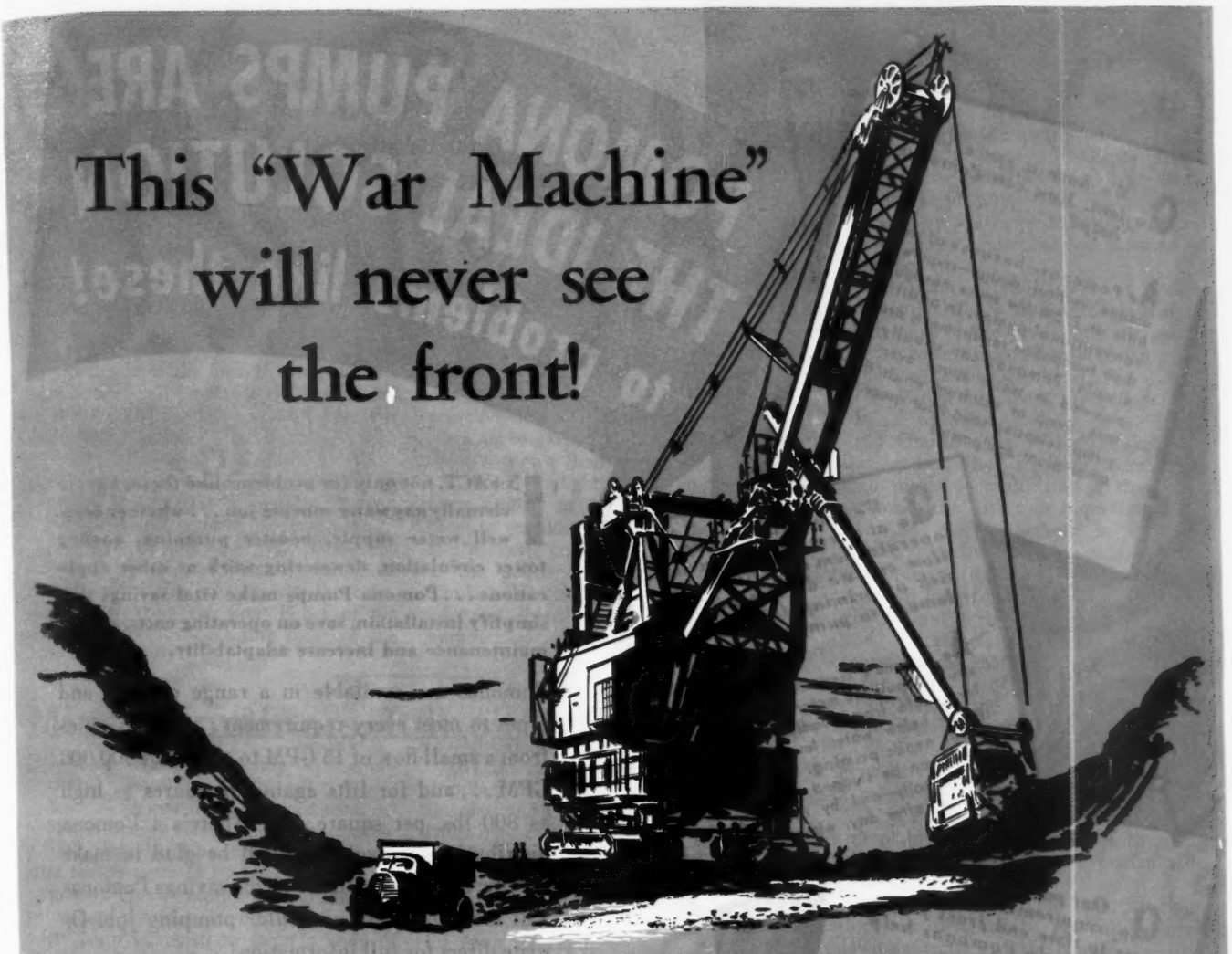
In other cases, there is a good traveling way in the intake airway that the men have been in the habit of using, as travel on the haulageway in that event is forbidden, and then leaving by the airway is the natural way for them to travel and they will travel it by preference. Where it is a shaft operation, the men will have to leave by a material shaft or stairway if the return being on the haulageway they cannot use the main hoisting shaft, but in some mines that is the preferred way of leaving.



How to make the haulageway into an intake, despite the use of a force fan: but the haulway and main portal or shaft then will be cold in the winter

* Continued from March, 1944, *Coal Age*, p. 100.

This "War Machine" will never see the front!



Giant shovels like this one are playing a vital role in our nation's coal production ... with the help of electricity and dependable wires and cables to carry it.

TO KEEP coal production steady, operators use large quantities of electrical power... delivered through modern research-built wires and cables like Anaconda's tough, rubber-saving Duracord* and it's all-rubber companion, Sunex Securityflex*.

Of particular interest today with the conservation of rubber all-important, is Duracord. This construction was developed during the last war to meet the need for super-strength cords and cables. Its "fire hose" jacket, woven from long fiber cotton, makes Duracord tough on the outside—the weak spot in most cables.

The Duracord jacket makes possible rubber savings as high as 50% without sacrificing any efficiency. For further information, please write us immediately. 42253

*Reg. U. S. Pat. Off.

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from mine to consumer

This familiar trade-mark symbolizes the best efforts of modern research and production.

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Subsidiary of Anaconda Copper Mining Co.
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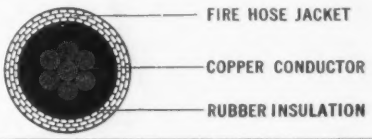
ATTENTION

Save Rubber with **DURACORD** *without Loss of Efficiency*

Here's a way you can effectively conserve rubber supplies and still get long-lived heavy duty electrical cords and cables . . . use Duracord.

This construction has served in some places for more than twenty years and it is still in use today. It is *not* a new construction.



Sunex Securityflex and Duracord

ANACONDA WIRE & CABLE COMPANY

POMONA PUMPS ARE THE IDEAL SOLUTION to problems like these!

Q. *We have a space problem. How can Pomonas help?*

A. Pomonas—because of their unique vertical design—require as little as 1/5th the space needed by conventional pumps. In addition, their foundation requirements are so simple, Pomonas can usually be mounted in waste space over the tank, sump or vat from which they pump, releasing solid floor space for other plant equipment!

Q. *We want to install pumps at a remote location and operate them automatically. How can we do this without risk of priming failures and damage to pumps?*

A. Pomona's modern vertical construction puts the motor above water level—safe from flooding—and the pump below water level where it never needs priming. Result—Pomonas can be stopped and started automatically—and by remote control—day after day, without risk of damage!

Q. *Our pumping requirements vary from time to time and from job to job. How do Pomonas help here?*

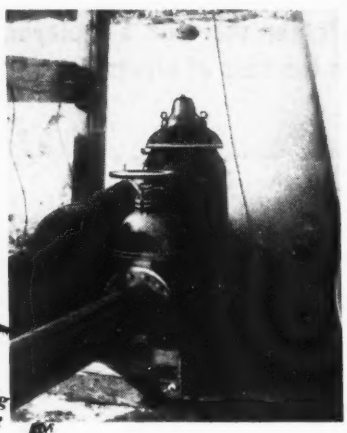
A. Pomonas are adjustable for varying capacities as well as adaptable to varying applications. The same Pomona you buy for deep well water supply can be quickly converted to booster pumping . . . or dewatering work . . . or construction operations . . . or other applications. And in any of these applications, capacities are adjustable up to 60% of the design point!

Q. *Power costs are the big item with us. What about Pomonas on this score?*

A. No other pumps can match Pomonas for low pumping costs. Their exclusive bulb shaped vanes, which minimize turbulence and internal flow friction, and their highly efficient impeller design which combines best features of both centrifugal and screw type propulsion, combine to boost pumping efficiencies as high as 90% and over.

IN FACT, not only for problems like these, but for virtually *any* water-moving job . . . whether deep-well water supply, booster pumping, cooling tower circulation, dewatering work or other applications . . . Pomona Pumps make vital savings that simplify installation, save on operating costs, reduce maintenance and increase adaptability.

Pomonas are available in a range of sizes and types to meet every requirement . . . in capacities from a small flow of 15 GPM to a flood of 300,000 GPM . . . and for lifts against pressures as high as 800 lbs. per square *inch.* There's a Pomona distributor near you who will be glad to make specific recommendations on the savings Pomonas will make on *your particular* pumping job. Or write direct for full information!



THIS POMONA, typical of many Pomona mine installations, shows the simplicity of installation characteristic of Pomona Pumps. This unit has a capacity of 600 GPM, lifting the water from 200 feet below ground against a total head of 430 feet. A big pumping job . . . *yet two simple beams laid across the bore hole is all the foundation the Pomona requires!*

POMONA PUMP DIVISION
JOSHUA HENDY IRON WORKS
POMONA, CALIFORNIA

POMONA PUMPS — Oceans of Water

Pomona Products

DEEP WELL PUMPS

NIAGARA PUMPS

MINE PUMPS

LITTLE CHIEF PUMPS

Q.—How would you approach the burning section of a mine when workmen are endeavoring to extinguish the fire?

A.—I would advance on the intake because on the return the air is full of explosive, poisonous and suffocating gases. I would watch the roof near the fire because the heat of the fire is likely to weaken the roof and cause parts of it to fall. I would be careful to keep myself and the fighting force some distance from the fire (even if the draft is enough to protect us from the heat and glare of it), for the roof may fall on either side of the fire. If it falls on the near side, it will endanger the workers; if it falls on the far side, it will drive the flame back toward the fire fighters. Loose rock should be taken down.

Q.—What precaution should be taken to defend the workers against the dangers incident to extinguishing a mine fire?

A.—Only experienced men should be employed in this work, and no one should be allowed in the mine except those engaged in fighting the fire. Belief in the advantage of short-circuiting some of the air has been expressed, but this air will then travel to the return, and there it may meet unconsumed gases from the fire; to these it may furnish air in which to burn and explode. The danger will be the more because the fire will not receive on the spot enough air to ignite these gases; in consequence, the return will be full of unconsumed gases. An explosion may then occur that will extend through the short-circuiting crosscut behind the men fighting the fire. This may injure them physically or may poison or suffocate them as they try to escape.

Moreover, the men will be unable to approach the fire as readily as if there were more air to sweep the burning gases from them and give them the fresh air needed for direct firefighting. Some firefighters favor a good air current that will enable them to get close enough to the fire to direct a strong current of water on the fire at the points which need water most. Similarly, if rock dust is used, air makes it safer and easier to get near the fire for that purpose.

Mine Examiners, Illinois*

Q.—When does a safety lamp become unsafe?

A.—(a) *When improperly handled.*

(1) A safety lamp (see illustration, p. 130) should not be exposed to methane after the presence of that gas has been ascertained, unless meantime its methane percentage has been lowered. A defective safety lamp was used to retest a body of firedamp after a safe lamp had found the gas, and the methane was ignited thereby. Especially is care needed when air is moving rapidly, as when (1) a shot is fired and drives the air violently from it or (2) where a large volume of air travels rapidly through a low narrow opening, as, for instance, where one place breaks into another.

(2) Safety lamps should be maintained vertical and not tilted in such manner that the flame from the wick will strike the gauze. The gauze is there to cool the flame, but, if the heat is too severe, the gauze will get hot, and the flame will not be sufficiently cooled. When thus heated the flame will pass through the gauze and ignite firedamp on the far side.

(3) Keep the gauzes of the lamp clean of dirt or oil. A man once scratched a match on a gauze. The gauze was no longer clean, and when the lamp was lighted and taken into the mine, the material scratched on the gauze carried flame to firedamp. Matches should not, of course, be carried into the mine. Do not let the lamp smoke, for it will dirty the gauze.

(4) In testing for the presence of methane in a mine, hold the lamp firmly by the bowl or font.

(5) Do not drop a lamp even if it suddenly fills with flame. Dropping a lamp in firedamp always is dangerous because of the air volume and pressure it creates and besides you may fracture the glass.

(6) Be careful to prevent water from dripping on the lamp, for it may shatter the glass and then burning methane in the lamp may escape uncooled.

(7) Examine your lamp carefully and see if it is in good condition even after the lamp inspector has passed it.

(8) Before entering the mine, see that the lamp is locked.

(9) Don't attempt to open a lamp within the mine except at a regular lamp station, where, under the rules of the mine, such opening is permitted.

(10) Don't set the lamp down on the floor of the mine, where it may be accidentally upset and extinguished or the glass broken. It is better to drive a stout nail in a prop and hang the lamp on the side.

(11) Before entering a room or a "tight end," examine the flame of your lamp and as you advance make frequent tests for methane. Make frequent tests during the shifts and again always before and after firing a shot, also before starting a machine.

(12) As a shot makes a blast of air and the air may be carrying methane, do not test for gas pockets when a shot is being fired. The flame may be carried through the gauze.

(13) If the lamp flames and the flame of the wick go out, be sure to examine the gauze, because methane within the gauze may be burning. To put it out, shut off the air supply or take the lamp to fresh air, if near at hand. Some miners smother the flame by putting the lamp under their clothes, but, if the gauze is red hot, it may ignite the clothes and thus fire the gas.

(14) Lamps with hardened wicks and gummy oil should not be taken into a mine. If the lamp does not go out, men will not want to violate the rules regarding relighting. A well-burning light is the best assurance that (1) compliance will be given to the law regarding the relighting of lmaps and (2) that the man carrying the lamp will not be exposed to the hazard of traveling with an unlighted lamp. These are reasons why the quality of oil used in the lamp is so important. Rusty gauzes neither carry away the heat from flame with due rapidity nor resist breakage.

(15) Don't attempt to relight a lamp with a cerium igniter in the presence of firedamp.

(16) Don't attempt with a cerium igniter to relight a lamp extinguished by the flaming of firedamp until the gauzes have so cooled that the top of lamp can be held with the bare hand.

(b) *When improperly* assembled.

What to watch.

(1) Omitting one or both gaskets and using gaskets that are broken or dirty. Small pieces of coal, sand or shale dust may make the gasket fit imperfectly.

(2) So placing gaskets in underfed lamps as to exclude entrance of air through the admission ring below the burner.

(3) In lamps intended for two gauzes, failing to put both in place.

(4) Placing on the top of the glass an expansion ring that was made for fitting on the underside of the glass.

(5) Placing the expansion ring upside down, thus destroying its fit.

(6) Failing to screw the bowl, or font, sufficiently tight that it will make a snug fit between glass and gaskets.

(7) Leaving out the igniting device without plugging the stem hole, thus providing a place for ignited firedamp to escape.

(8) Failing to place the deflection rings, which are designed to prevent air from blowing directly into the lamp.

(9) Placing a defective or dirty gauze on any part of a lamp. A gauze with a broken wire or an enlarged hole should be destroyed. A new gauze should be thoroughly burned out before being given to the miner, for, if of iron wire, it usually has been given a paraffin or oil coating that will be likely to carry the flame to the outside of the lamp, if the latter is inserted in an explosive mixture.

(10) Overfilling the fount.

(11) Wick picker should not hang below bottom of fount where it may be bent.

(12) Lamp should be tested by blowing air against the chimney joint while the burning lamp is revolved. If the flame wavers, the gaskets are not tight.

(13) Lamp should be tested in a testing box containing an explosive atmosphere.

Water Gage Needed

Q.—In the airway 20,000 cu.ft. of air is passing per minute. The rubbing surface is 35,000 sq.ft. and the sectional area 35 sq.ft. What is the water gage?

A.—Velocity=Quantity passing ÷ cross-section=20,000÷35=571.4 ft.

$p = ksv^2 \div a = 0.000{,}000{,}02 \times 35{,}000 \times 571.4^2 \div 35$

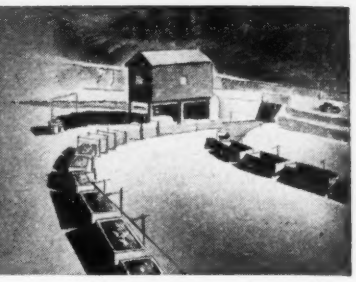
Cancelling the 35s

$p = 0.000{,}02 \times 571.4^2 = 6.5299$

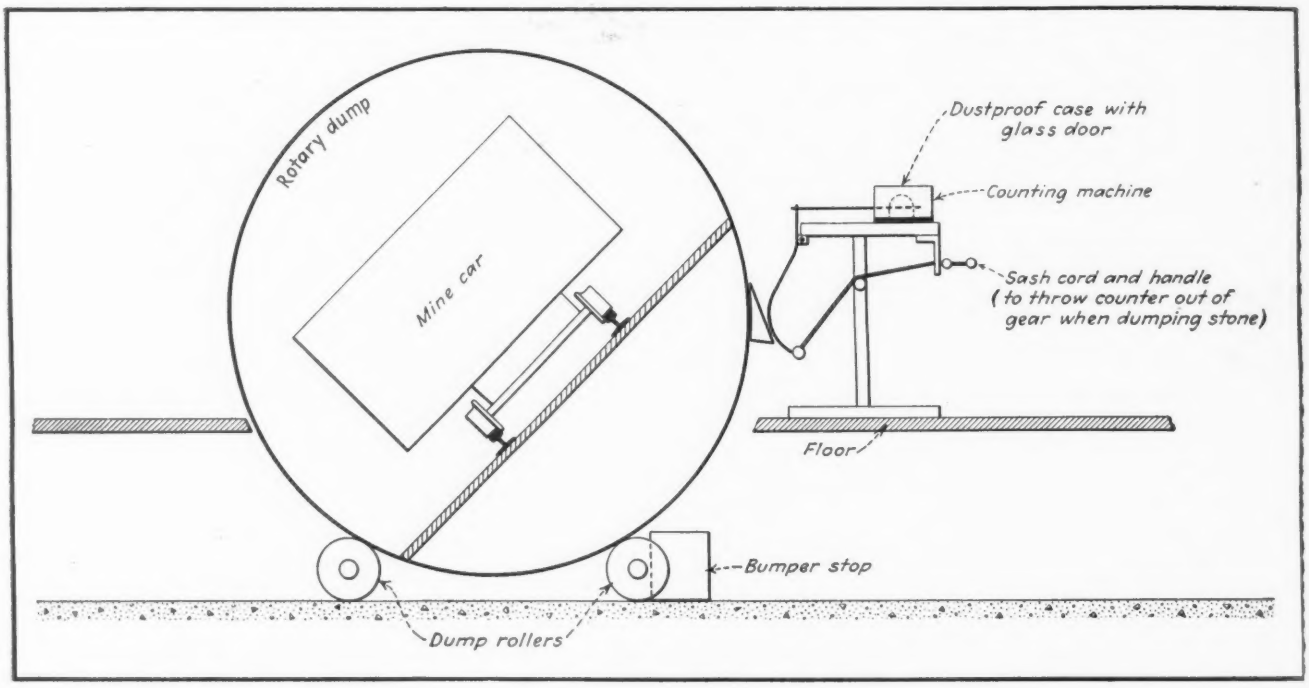
Dividing by 5.2 lb. per square foot, the pressure of 1 in. water gage, we get about 1.25 in., which is the water gage that will drive 20,000 cu.ft. of air per minute through this particular airway.

*Continued from March, 1944, *Coal Age*, p. 100.

TIMELY OPERATING IDEAS



Counter Records Cars Dumped



"A 'PRODUCTIMETER' on the rotary dump gives instantly an accurate and continuous record of the number of cars dumped at the mine of the Powhatan Mining Co., Powhatan, Ohio," writes Edward Fellabaum. Solving the problem of obtaining an "accurate check on dumping records was made possible by the expenditure of a small sum for a counting machine and a few hours' labor. The accompanying sketch shows how the installation was made. Though the dump is large and the machine small, it was necessary to place the counter convenient to the operator so he can read it instantly. As the dump turns over two cars at once, one is registered as the dump turns over and the other as it comes back.

"Reciprocating motion to operate the counter is obtained by causing the bumper on the dump to brush a hinged arm to which is attached a connecting rod which operates the counter. All excess motion and shocks are absorbed by suitable coil springs and stoppers which make the counter's operation practically infallible. The counter is inclosed in a dustproof case with a glass door. Records are taken and the counter is set at zero (which takes but a few seconds) at the end of each shift. As the sketch attempts to show, the machine can conveniently and instantly be thrown out of gear when dumping 'stone.' Inasmuch as this 'stone' comes mixed in the coal trips, the operator must do this to keep the record clear.

"The satisfaction experienced with this car counter is considerable and we could not conveniently do without it," Mr. Fellabaum declares. "It has been worth its cost many times over and probably will function for many years to come."

Disabled Converter Kept Working

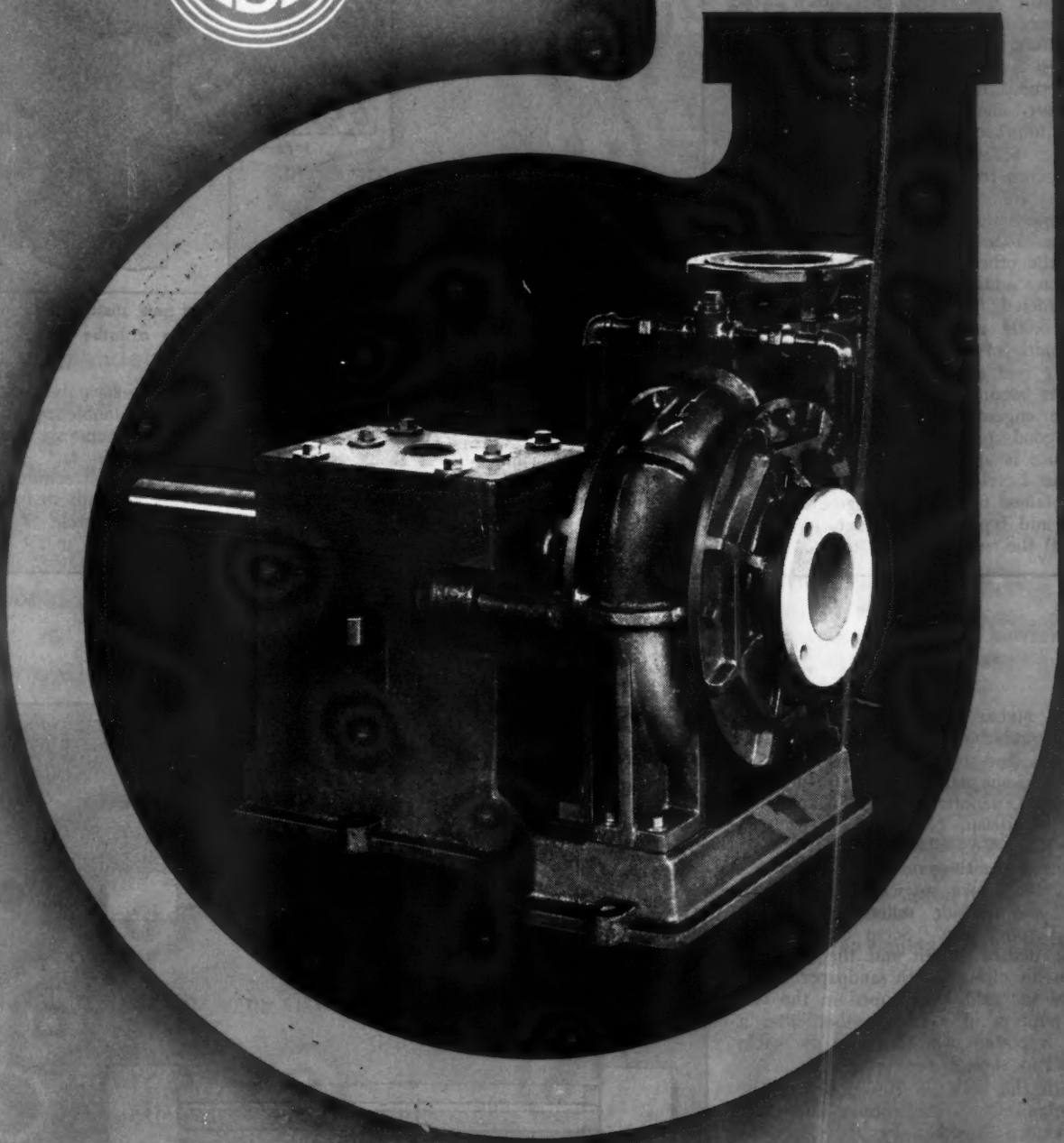
CUTTING OUT a damaged field coil in a 200-kw. rotary converter kept a substation in service and enabled production to be maintained, according to a report from Glenn Johnson and P. J. McAlarnis, Hardy-Burlingham Mining Co., Kentucky.

One of the six field coils went bad and no spare field was available for immediate replacement. Production depended upon the services of this converter. The defective field coil was cut out while awaiting receipt of new fields. As a result, the converter was again released for service and continued to function until a new field coil was obtained.

The only operating irregularity noticed was a slight burning of the defective field during the starting interval. As soon as the voltage built up to its normal value, however, this trouble was automatically eliminated. The effects on the machine were unnoticeable. Vibration and oscillation were practically the same as before.

WHAT'S THIS PUMP GOT THAT NO OTHER PUMP'S GOT

Answer on page 225



ITS DIFFERENCE SHOWS IN APPEARANCE AS WELL AS IN PERFORMANCE

THE ALLEN-SHERMAN-HOFF CO., 231 S. 15th Street, Philadelphia 2, Pa.

Offices or Representatives in most Principal Cities

Engine Compression Maintained

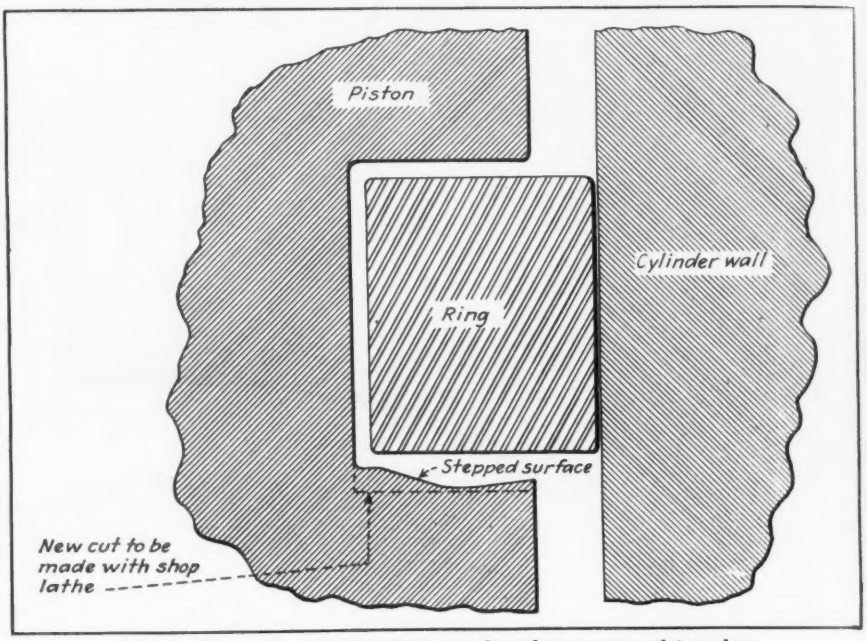
THE CONDITION of piston-ring grooves on diesel and gas engines should be closely checked during the "down for overhaul" periods, writes P. C. Ziemke, Oak Ridge, Tenn.

When the wearing away of metal surfaces (known as stepping) can no longer be compensated for by inserting oversize rings of either the plain or double seal pattern, many years can be added to the life of the piston by widening and regrooving the worn grooves on the shop lathe, after the manner shown in the accompanying sketch. After grooves are thus trued up, and oversize rings fitted, a perfect seal is assurred.

In those instances where stepping is aggravated and truing cannot be achieved, some improvement can be had by installing the old-style plain rings in the badly worn top grooves and inserting the double seal type in the lower grooves. It is good practice to cut the first three grooves a few thousandths inch wider than the others, so that the upper rings will have additional side clearance. Rings are ordered for a given width, usually from 0.004 in. to 0.012 in. less than the width of the piston groove.

"We find that the greatest side clearance is required on rings used in our 2-cycle engines. Experience has proved that good practice for 4-cycle engine clearance is approximately 0.004 in. and for the 2-cycle, 0.012 in." Best results are obtained by stating the groove width, make and type of equipment; leaving it up to the manufacturer to make the proper clearance allowance when the order is filled.

"Rings must be checked in the smallest part of a worn cylinder for end clearance," says Mr. Ziemke, "or damage may easily result." No set rule has been established by engine authorities; therefore it is left to the individuals' judgment. Best results have been had with the laminated or double-seal-type ring, where scaling is not seriously affected by the end clearance. In fact in one instance full power was restored in an engine that had an indicated clearance of 0.078 in. at the bottom of the ring travel opening to 0.561 in. at the top.



Sketch shows the poor fit which results when a new piston ring is used before "stepping" has been removed by a lathe tool.

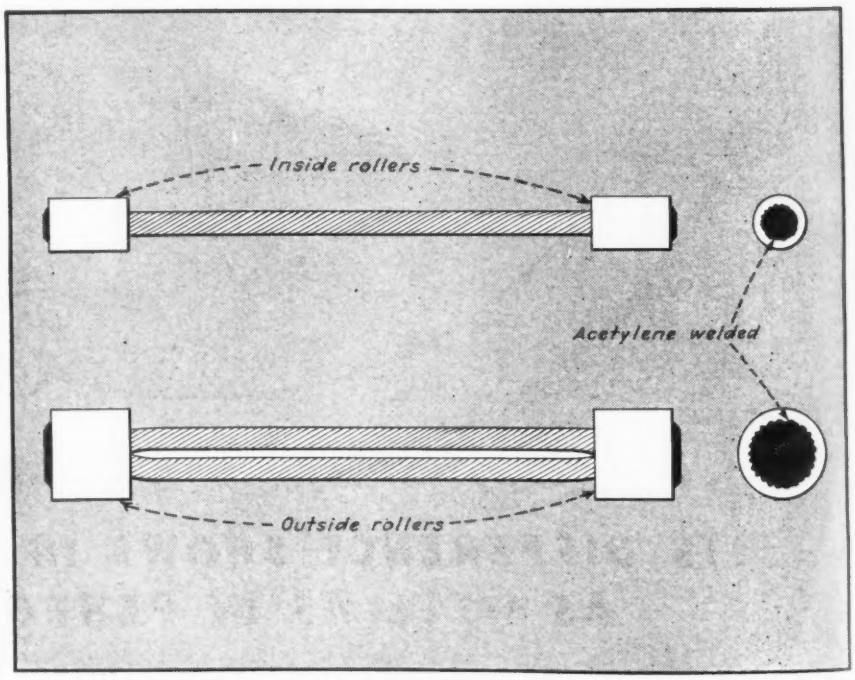
Scrap Heap Produces Bonds

SHORT PIECES of discarded motor or machine cable or rail bonds with missing terminals and rollers from an old 472 sprocket chain may be fabricated into useful bonds, reports Thomas McFarland, mine electrician, No. 1 Mine, Virginia Jellico Coal Co., Clairfield, Tenn.

After dismantling an old 472 sprocket chain, the inner surfaces of both the inside and outside rollers are cleaned with a round file. Scrap cable is cut to the desired length and the ends are thoroughly cleaned with sandpaper. One end of the cable is clamped in the vertical position in a vise so that, after a roller is placed over the end, the cable end is ¼ in. short of the top.

With the bond in this position, Mr. McFarland says, the copper and steel are bonded together by the acetylene process, using an O-B copper rod. When it comes to attaching the bond to the rail, the steel metallic arc-weld process is used.

"We find the single-wire bond," says Mr. McFarland, "to be very satisfactory on robbing work or short entries. The 2-wire bond works equally well on the long entries."



Fabricated bonds using one- and two-conductor sections.

How Simplified Wire Rope Practice Benefits the Consumer

Simplified Practice for wire rope—as defined in recommendation R198-43 of the National Bureau of Standards—has been in effect since February 15, 1943. The industry has whole-heartedly accepted this reduction in sizes, grades and varieties of wire rope.

The overall reduction is from 973 items to 643, or 33.9 per cent. In the four rope constructions which represent the industry's major tonnage, the reduction is from 352 items to 182, or 48 per cent. We think that simplified practice is proving its worth.

To the consumer, there are obvious benefits in simplification. In nearly all cases he will find a rope available that fits his needs, and in addition he will get quicker deliveries and better service.

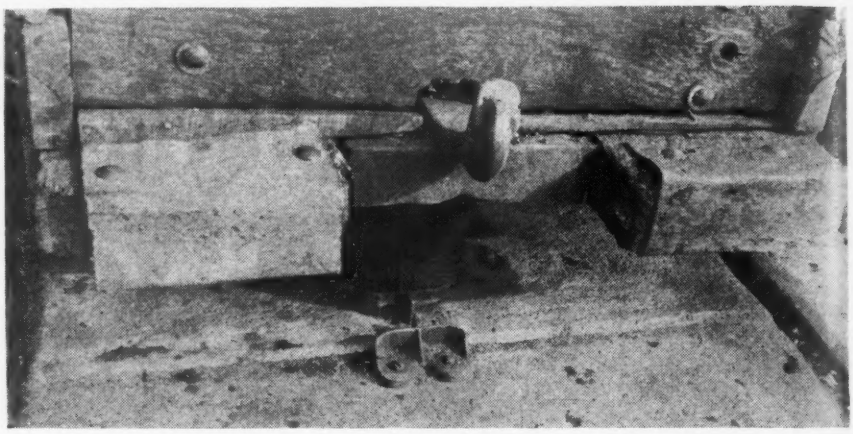
So we say to wire rope users: Stick to simplified practice ropes. We'll be glad to help you solve your problems. And, of course, simplified practice does not preclude manufacture and sale of special-purpose ropes, such as those listed in our new Wire Rope Catalogue, No. 165. Write to Bethlehem Steel Co., Bethlehem, Pa., for a copy today.

THESE ARE THE 20 STANDARD TYPES OF WIRE ROPE LISTED IN VARIOUS GRADES IN R198-43

- 6 x 7 wire rope
- 6 x 19 wire rope
- 8 x 19 wire rope
- 6 x 37 wire rope
- 6 x 19 elevator rope
- 8 x 19 elevator rope
- 5 x 19 marline clad rope
- 18 x 7 non-rotating rope
- 6 x 12 galvanized running rope and hawsers
- 6 x 24 galvanized steel mooring lines and hawsers
- 6 x 37 galvanized steel hawsers
- 6 x 25 type "B" flattened strand wire rope
- 6 x 30 type "G" flattened strand wire rope
- 6 x 8 type "D" flattened strand wire rope
- 6 x 6 x 7 tiller rope
- 6 x 7 iron, bright, and galvanized sash cords
- 9 x 4 galvanized mast arm rope
- 6 x 19 marline clad grain-shovel rope flat rope
- 6 x 7 galvanized iron rigging and guy rope

Center Floor Board Saved From Splitting

PIT-CAR floor boards that serve also as bumpers always have been armored with steel plate to prevent splitting. Usually the center board, which has to take the gaff from loose link couplings, has not been so protected and frequently has to be replaced. Albert Valentine, mechanic for the Freeman Coal Mining Co., Herrin, Ill., however, has devised a scheme for protecting the center board so that replacement is very infrequent. An angle is welded to the under side of the drawbar at each end and the floor board is snugly fitted and fastened with two bolts through each angle. The assembly is then bolted to the axles and body frames. As the illustration shows, the angle gets some punishment.



Low-Cost Items Stocked in Shop

TO ATTAIN a happy medium between systematic procedure carried to a burdensome degree and a looseness bordering on chaos always is a problem in dispensing mine supplies for maintenance work. Obviously it would be carrying system a little too far to require a mechanic to make a trip to the warehouse and present a requisition every time he needed a $\frac{3}{8}$-in. washer and obviously it would be rather ridiculous to leave the mine supply of 115-volt lamps out where anyone could help himself whenever a renewal was needed. The accompanying picture of a rotary-type supply bin recently placed near the center of a room housing the machine-tool and winding department of a mine shop illustrates an attempt to get the closer to that happy medium.

This bin is in the central shop of the Consolidation Coal Co., Jenkins, Ky. Although the central supply house is adjacent to the shop, the distance from the center of the shop to the door of this building is about 250 ft. If a mechanic or electrician makes ten trips per day to the warehouse he has covered nearly a mile. The warehouse clerk often is busy when the man arrives, thus occasioning delays. Labor cost of getting a 5c. bolt can range from 15 to 50c., not counting the warehouse clerk's time.

The bin placed in the shop has eight rotary trays each with 15 pockets—total, 120 pockets. Principal items kept in these pockets are cotter keys, washers, small capscrews, small machine bolts, nuts, stove bolts and rivets—each size kept separate. Once a week, or as required, the whole unit is checked over and the supplies are replenished by a man making one trip to the warehouse. Moreover, this job can be delegated to a helper instead of a mechanic.

Always Around

There never comes a time when new problems or old problems in a new form are lacking around a coal mine. Ideas, therefore, are always worth money. This department is in the business of passing along such ideas to operating, electrical, mechanical and safety men. If you have one, here is the place for it. So send it in, with a sketch or photo if it will help to make it clearer, and earn a little money on your next war bond. For each acceptable idea, Coal Age pays $5 or more.

Vibrator-Conveyor Unit Is Truck-Mounted

"THE PROBLEM of removing coal breakage resulting from tipple operation and truck loading has been satisfactorily solved by a truck-mounted vibrator-conveyor unit designed and built under the supervision of John Koenig, superintendent and co-owner of the Sunshine Coal Co.," writes Walter S. Chansler, Bicknell, Ind. This operation was described in an article in the December, 1943, issue of *Coal Age*, p. 90.

The unit in question consists of an Ajax vibrator and a homemade belt conveyor mounted on a Diamond T truck chassis. With this unit, trucks can be loaded from any one of the twelve coal bins in the tipple with rescreened coal (wet or dry) without the usual breakage encountered in ordinary loading.

In planning the construction of this unit, five important points came up for consideration. The unit had to be of such height as to accommodate itself to the clearance underneath the tipple, which at the Sunshine mine is 9 ft. Its hopper arrangement had to be such as to take care of the screenings with considerable capacity and adequate convenience of dumping. Its conveyor adjustment of necessity had to be simple, and yet such as to facilitate loading trucks with beds of varying height. It had to be portable—easily moved from place to place. And it had to be operated easily by one man. To get a compact unit embodying all these qualities was the con-

Portable ELECTRIC CAP LAMPS

"Powered By Gould Glassklad Kathanode"

The Light For Men With a Job To Do

★ Under the grueling strain of wartime production demands, strong men, with plenty of endurance, are engaged in producing more tons of coal per man than was previously thought possible. To maintain this peak production it is necessary to supply these men with high caliber equipment to support their efforts. For this purpose, Portable Electric Cap Lamps are being more extensively used in mines all over the country.

The highly efficient double filament bulb used in the Portable Electric Cap Lamp gives the proper amount of illumination where it is needed. Your men are assured of proper illumination throughout the entire shift because if one filament should burn out the other can be immediately brought into play by merely turning the switch.

WRITE TO-DAY FOR COMPLETE DETAILS

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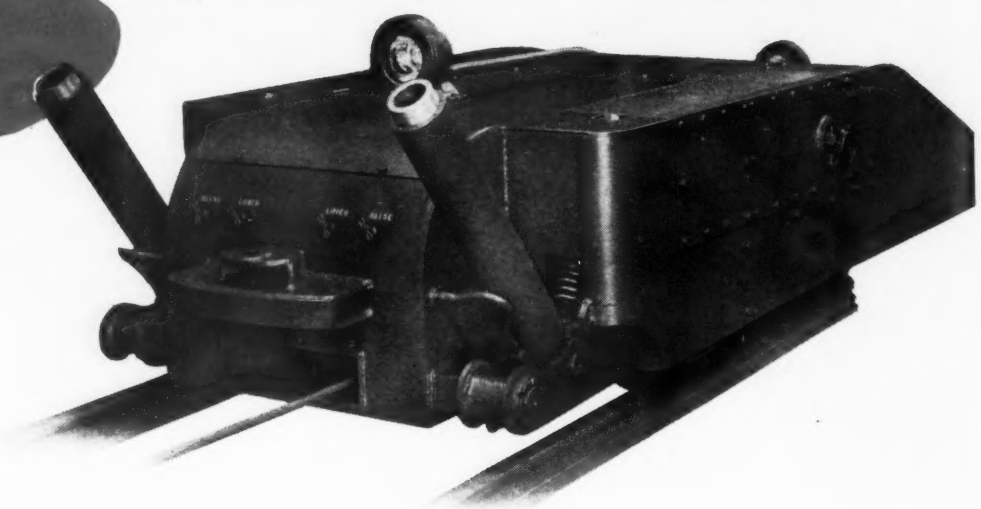
Safety Caps and Hats • Electric Cap Lamps • Flame Safety Lamps • Trip Lamps • Permissible Flash Lights
Shot Firing Equipment • Safety Shoes • Gas Masks • Goggles and Respirators • Haulage Safety Equipment • First Aid Supplies

News! BROWN-FAYRO *Announces* NEW POST PULLER



BROWN-FAYRO HAS DEVELOPED
a new machine to recover props and headers in worked-out sections of coal mines.

SAVE LABOR

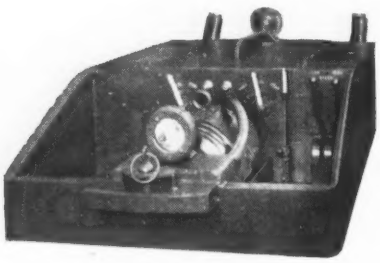
SAVE COAL

SAVE COST

The salvaged timbers are close to the place where they will be used next and need little handling and transportation.

Better roof control prevents crushing of coal and overweighting of live workings.

The timbers which are recovered can be used again effecting a considerable saving in operating costs.



MOTOR END VIEW OF POST PULLER

TWO-SPEED TRANSMISSION— gives a dislodging rope pull of 20,000 lbs. at 10 ft. per minute, and a drag-out speed of 100 ft. per minute. ¾″ wire rope is used.

HYDRAULIC CONTROL— results in ease of operation and keeps the maximum pull within the safe loading of the rope.

FRICTION CLUTCHES— provide rapid and shockless change from dislodging to drag-out speeds.

HYDRAULIC JACKS— anchor the machine in position quickly and effectively. Removable jack extensions can be made for various roof heights.

PERMISSIBLE CONSTRUCTION— all electrical equipment is explosion-proof.

TRACK MOUNTED— suitable for 36″ and wider gauges.

SELF-PROPELLED— equipped with auxiliary trolley pole for use where ventilation permits.

DIMENSIONS— Length over bumpers—11′; width of frame—4′ 8″; height to top of frame—28″; weight without cable or rope—7600 lbs.

Write today for detailed data on Model HP Post Puller. Other Brown-Fayro products: Car Spotters, Portable Blowers, Gathering Pumps, Room Hoists, Mine Cars and Parts, Car Retarders, Rerailers, and Sheaves.

THE BROWN-FAYRO COMPANY
JOHNSTOWN, PENNA.

struction problem. How it was worked out can best be told by giving a description of the unit.

"The Ajax vibrator and the conveyor are mounted on an angle-iron frame which in turn is mounted on the truck chassis. This particular make of vibrator was used because it could be mounted with very little pitch, which was a necessity for clearance under the tipple bins.

"The vibrator is located above and to the rear of the truck cab and extends 3 ft. out over a metal hopper. It is powered by a small electric motor independent of the conveyor. The screen, with $\frac{5}{8}$-in.-mesh wire cloth, has 3-in. sides which narrow down at the discharge end to form a 28-in. throat. Three-inch flaring sideboards welded to the top of the frame help to increase the capacity of this hopper. The vibrator sets with the discharge end 5 ft. above the truck frame while the top end is 5 ft. 4 in., giving the screen a 4-in. fall.

"The metal hopper underneath the vibrator has a bottom dump, which is tripped by a short lever at the right rear. A small hinged door at the end of the hopper on the right side of the unit permits inspection and cleaning. This bin, or hopper, 5 ft. 6 in. long, 48 in. wide at the top, 36 in. wide at the bottom, and 48 in. deep, is mounted crosswise on the truck chassis just back of the cab. It is made of sheet iron and sets with its top edge 18 in. below the discharge end of the vibrator screen.

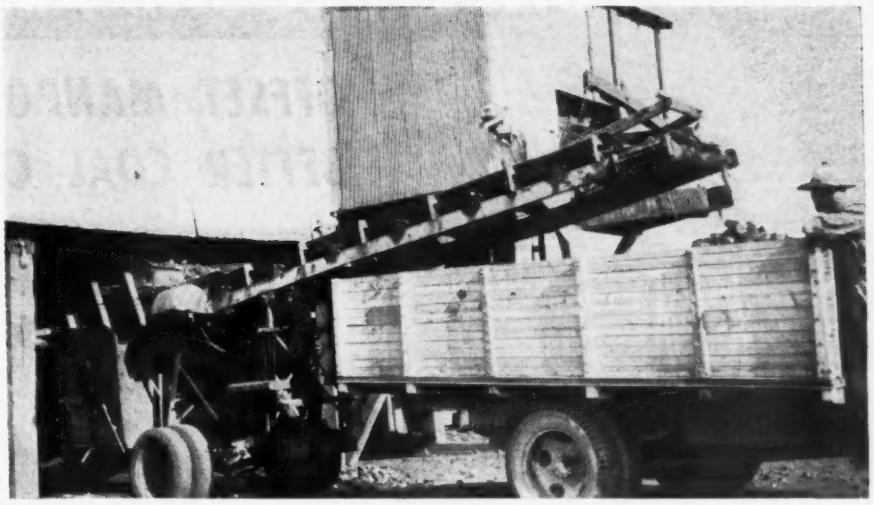
"The conveyor—which takes a smooth rubber belt 14 ft. long and 28 in. wide—is hinged to the angle-iron frame at the rear of the dust hopper and a few inches beneath the throat of the vibrator. The small motor that powers it is located at the right side at this end. At the extreme rear end of the truck chassis an adjustable sliding frame supports the conveyor and permits up-and-down movement essential to prevent breakage of coal in loading trucks with beds of varying heights.

"Adjustment is by means of a Simplex jack, which is built in at the base of the adjustable sliding-frame support. This permits a range of movement at the outermost tip of the conveyor varying from $7\frac{1}{2}$ to $10\frac{1}{2}$ ft. Adjustment for taking up slack in the conveyor belt is provided by threaded bolts and lugs connected to a movable roller at the discharge end. Conveyor rollers, eight in number, permit cupping of the belt, which keeps the coal in the central portion of the belt and prevents leakage. This is further guarded against by narrow flaring sideboards running the full length of the belt. At the point where the adjustable sliding frame is mounted are two steps, or 'standing boards,' one at each side of the conveyor, where men may stand and pick gob or otherwise clean coal while the unit is in operation.

"One man operates the outfit. Power is applied by means of a switch underneath the conveyor, which is mounted on the adjustable sliding frame and controls either motor independently or both simultaneously, as may be required. A long cable brings power to the unit from plug-in stations underneath the tipple.

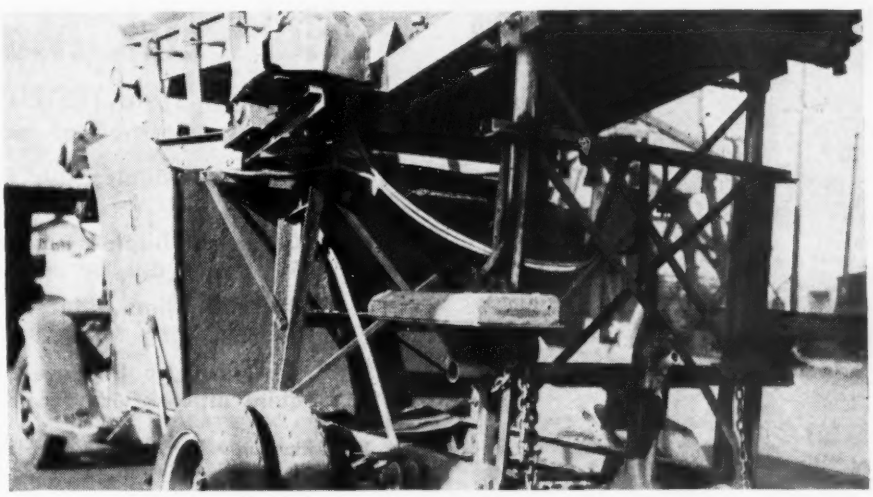
"As the height of this unit is 8 ft. 11 in. over all, there is only 1 in. of clearance underneath the tipple bins, which gives a fall of only a few inches between the bin doors and the vibrator screen, thus reducing the chance of coal breakage at this point. The length of the conveyor makes it an ideal unit for loading covered trucks and 'box-car' jobs. The unit has a coal-loading capacity of nearly 1 ton a minute, which is a great advantage in speeding up loading during rush periods.

"After almost two years of experimenting, altering, and remodeling," says Mr. Chansler, "the perfected unit is as shown in the accompanying illustrations. Three years of constant operation has proved its worth, as it has been a very big factor in building trade at Sunshine mine."



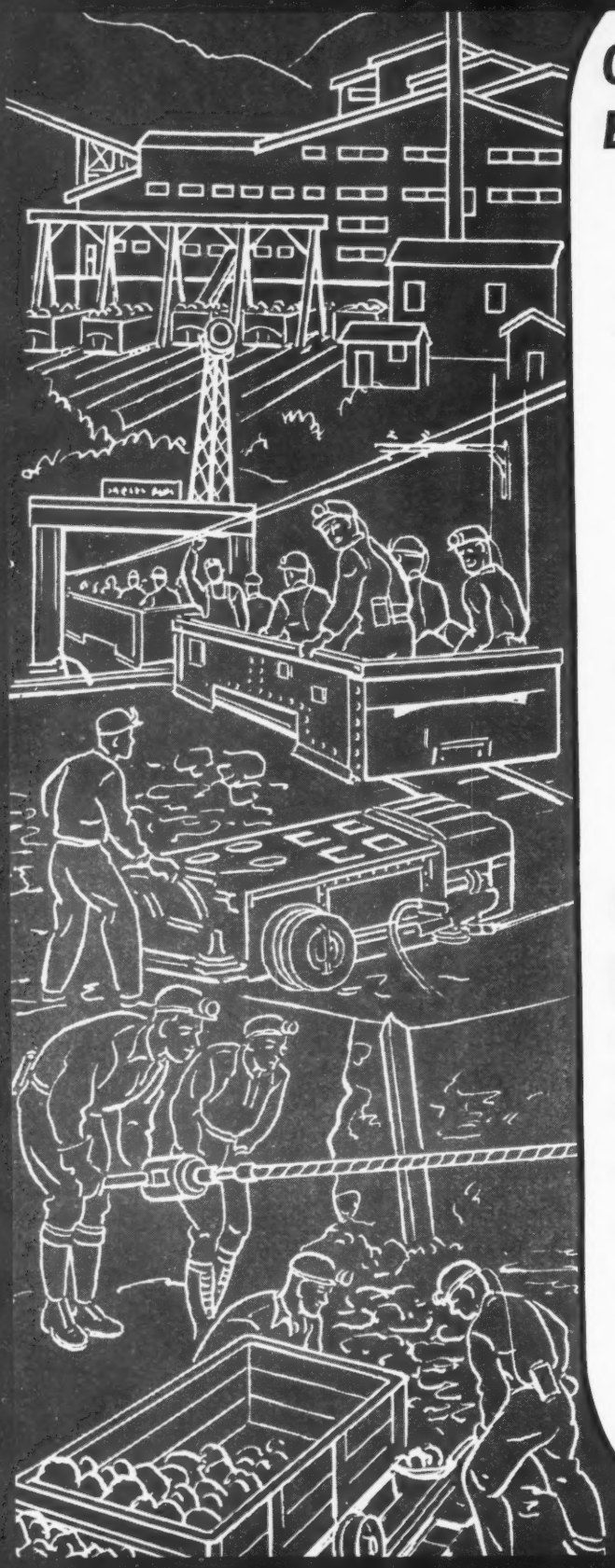
Truck-mounted vibrator-conveyor unit in operation.

The complete unit—vibrator, conveyor and hopper mounted on truck chassis.



Close-up of mechanism for adjusting conveyor height.

AMERICA'S UNDERGROUND ARMY NEEDS *HELP!*



OFFSET MANPOWER LOSSES WITH BETTER COAL CUTTING EQUIPMENT

CINCINNATI Chains and Bits Help Lick Manpower Problem

Cincinnati TIME TESTED Duplex Chains and Bits help mine operators offset manpower problem. Here's why!

- **Cincinnati Duplex Bits ELIMINATE BIT SHARPENING OPERATIONS at the mine which saves valuable manpower.**
- **Cincinnati Duplex Bits reduce BIT HAULING TIME of Mine Sharpened Bits by approximately 90%.**
- **Bit setting time reduced 75% with each point on the Duplex Bit outcutting from 2 to 6 ordinary Mine Sharpened Bits.**
- **Cincinnati trouble free DUPLEX CHAINS, BITS and BARS require little servicing and reduce shutdowns to a minimum.**

Hardened Eccentric Pin is designed so it can't turn in block . . . placing Joint Wear between pin and insert.

Replaceable long-life, hardened alloy steel Connector Insert that gives new factory joint accuracy to a worn connector.

Alloy Steel heat-treated Rivet that holds bearing pin against longitudinal displacement. Easily removed.

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO

Plans to Meet Fuel Needs Pushed

Late Seasonal Developments Bring About Changes—Rationing Deemed Unnecessary—Plans Afoot to Facilitate Lake Shipments and Stockpiling

DEVELOPMENTS on the fuel front in the last month were marked by revision of regulations to meet changing conditions. The diversion order to meet short supplies in the Southeast, for instance, having relieved conditions there, the order was modified. Then, too, action was taken to facilitate lake coal traffic and to encourage rebuilding of depleted stockpiles at the end of the heavy burning season. To further local schemes to conserve fuel, another district engineer and twelve additional coordinators were named.

Predicts Deficient Output This Year—On the basis of present trends, coal production will fall 20,000,000 tons short of requirements, a deficit which must be met by sound distribution and real conservation, Charles J. Potter, Deputy Solid Fuels Administrator, predicted on March 7 at the annual meeting of the Chicago Coal Merchants' Association. He added that anthracite output this year may be expected to be 5,000,000 tons short of domestic solid-fuels requirements in the Mid-Atlantic and New England States. "We have been as painstaking and searching in estimating our prospects for meeting these requirements as we were in ascertaining their extent," he said.

WPB Decides Against Rationing—Maintaining that supplies were sufficient to permit continuation of the system of allocating coal to dealers on a restricted basis, the War Production Board decided without argument March 21 that there was no present need for coupon rationing of coal to consumers. There were practically no exceptions to the WPB decision by other agencies, according to a spokesman for Donald M. Nelson, chairman. OPA suggested that if there were a substantial cut in the supply of coal to consumers, issuance and use of coupons through a system comparable to that for fuel oil would provide tighter controls than the control put on dealers only. When it was shown that the cut would not be great, OPA concurred in the final decision.

To Encourage Rebuilding Stockpiles—To facilitate rebuilding of depleted industrial stockpiles as rapidly as coal is available after the close of the heavy burning season Secretary Ickes modified bituminous coal distribution regulations March 17 as follows: (1) Substantially suspended restrictions on stockpiling of bituminous coal in Indiana, Illinois and western Kentucky production districts to encourage stockpiling up to 90 days' protection; (2) gave assurance that restrictions on stockpiling of coal mined in other Appalachian districts will be relaxed about May 1 wherever possible; (3) warned industrial consumers in all districts that if they do not utilize, in conjunction with producers, every opportuntiy to build stockpiles and keep mines busy when coal is available they are likely to face serious difficulties next winter in obtaining enough coal to maintain unimpaired operations.

Issued as Amendment No. 3 to SFA Regulation No. 10, the modification on industrial stockpiling restrictions for coal mined in Districts 9, 10 and 11 suspends restrictions except for consumers having more than 120 days' supply. In such cases, consumers are forbidden to order and receive more than enough coal to meet current requirements unless written permission has been obtained from SFA. As an inducement to industrial consumers of coal produced in the three districts to build stocks they are assured in the amendment that all of them having from 40 to 90 days' supply, when restrictions are again instituted next winter, will be treated alike in determining the percentage of current requirements they may order and receive upon the basis of their days' supply as long as they remain in that group. A different rate may be applied to industrial coal purchasers having less than 40 days' supply and those with more than 90 days' probably will be required to cut their purchases much more than those with from 40 to 90 days' supply.

Mine Employees Reach Minimum—Employment in coal mines has shrunk to about 465,000 workers, the rock-bottom level capable of insuring production of the nation's 1944 requirements of 620,000,000 tons of bituminous and 66,700,000 tons of anthracite, Paul V. McNutt, chairman, War Manpower Commission, announced March 2. "To produce the required coal it is absolutely necessary that miners stick to their jobs," said Mr. McNutt. "Any further weakening of the mining force might easily be disastrous. WMC, in cooperation with management and labor, is going to make an all-out effort to keep it at its present level." Bituminous employment declined from 437,000 in January, 1943, to about 392,000 in January, 1944. In anthracite, the decline for the same period was from 82,000 to 73,000 workers.

To Reconsider Miners' Draft Status—National Headquarters of Selective Service, upon receipt Feb. 26 of a memorandum from President Roosevelt to Maj. Gen. Lewis B. Hershey, director of Selective Service, and Paul V. McNutt, chairman, War Manpower Commission, sent the full text of the memorandum to all State Selective Service directors with instructions that local boards review the cases of all registrants of ages 18 through 37 deferred in classes 2A, 2B, 2C and 3C. In considering

CONSERVE PAPER

Paper, no less than steel and rubber, is needed for war uses, in the making of fighting material and in civilian requirements at home. The supply is limited. The need for its intelligent use is great. Conserve paper to promote the war effort. Use as little as you can and make that little go far. And when paper has served as many uses as possible, see that it is salvaged for other war service.

the reclassification of such registrants existing regulations, instructions and information will be applied in the light of the President's memorandum, giving particular attention to registrants under 26 in view of the President's statement that agriculture and industry should release the younger men for military service.

Order Issued to Facilitate Lake Coal Traffic—To permit unrestricted coal movement on the Great Lakes until the iron-ore traffic reaches its full stride this season, the Office of Defense Transportation on March 3 temporarily suspended restrictions giving preferential treatment to ore cargoes. Suspension Order ODT 9A-1 suspends until May 15 all restrictions on coal movements on the Lakes. ODT officials said that the relatively mild winter should make possible an early opening of lake navigation.

With indications pointing to early opening of the Lakes shipping season, Secretary Ickes said March 17 some pre-season permits already were being issued covering railroad movements of coal to lower Lake ports. The first vessels for upper Lake docks were expected to clear lower ports about the end of March. Mr. Ickes emphasized that pre-season permits are issued only in instances when boats are available at lower Lake Erie ports for immediate dumpings of coal directly from railroad cars into vessels so as to prevent needless detention of railroad cars badly needed elsewhere.

Lake Surplus Coal to Move Immediately—Administrator Ickes announced March 22 that surplus coal stored on Great Lakes docks had been released for immediate movement to make room there for coal being produced at the mines for distribution in the lakes area. Deputy Administrator Potter signed an amendment to Regulation 10 that will permit the movement of the surplus coal in anticipation of the opening of the lake navigation season. Movement of this coal had been restricted by Regulation 10, which prohibited industrial consumers and railroads from obtaining more coal from lake docks than necessary, in addition to their inventories, to meet their consumption requirements until May 31, 1944. As now amended, Regulation 10 provides that industrial consumers and railroads may not receive from dock operators more coal than necessary, in addition to their inventories as of March 21, 1944, to meet their consumption requirements until May 15, 1945. The amendment requires commercial dock operators "to spread the coal on their docks as of March 21 among their customers equitably so as to permit all of them to commence to build reasonable stockpiles."

Plan Local Schemes to Conserve Fuel—The nationwide campaign to save coal, fuel oil, heating gas and other fuels received additional impetus March 3 in Chicago when officials in charge of the national efficiency program met to plan local campaign procedure. Simultaneously, Secretary Ickes in Washington announced appointment of another district engineer and twelve area coordinators for the campaign, being conducted by volunteers from industry in cooperation with the U. S. Bureau of Mines.

Retail Advisers Named—Solid Fuels Administrator Ickes announced Feb. 28 the appointment of 16 retail coal industry representatives to constitute a SFA national advisory committee on local distribution to make recommendations to SFA concerning problems involved in assuring an equitable national distribution of retail coal and coke. Serving on a voluntary basis, the committee will function in accordance with the general program provided for in SFA Order No. 12.

Byproduct Coal Shipments Controlled—SFA issued Regulation No. 16 on March 2 prohibiting shipment of any byproduct coal except in accordance with a contract made on or before March 10, 1944, or with instructions or directions issued by SFA. The regulation also required information and reports, on or before March 15, showing byproduct coal tonnages contracted for in the period April 1, 1944, to March 31, 1945, and, in the case of consumers, a statement of estimated minimum requirements for this period over and above the quantity under contract.

Diversion Order Lifted—Because acute shortages of domestic coal in seven Southeastern States have been relieved, special restrictions upon retail dealer inventories and domestic consumer deliveries in the area have been lifted to permit coal distribution to resume its normal pattern, Secretary Ickes announced March 11. A direction to mine operators in the nation's largest bituminous-coal producing district to withhold 5 percent of their tonnage weekly for specific direction of SFA, chiefly into the Southeastern States, also has been lifted, Mr. Ickes said.

To Promote Wider Use of Fines—A wider utilization of anthracite fines to reduce an annual surplus of 1,000,000 tons of this kind of fuel and to relieve shortages in other fuels is being investigated by Bureau of Mines engineers, Secretary Ickes stated March 22. The investigations and experiments, being made at the request of SFA, will explore the possibilities of using more anthracite fines—No. 3 buckwheat and smaller—to mix with bituminous coal in briquets, to replace low-volatile coal in byproduct coke ovens in gas producers that normally use larger sizes of anthracite, the Secretary said.

To Cut Use of Hard Coal and Coke—Secretary Ickes puts into effect April 1 a comprehensive program to reduce consumption of anthracite and coke by householders and other domestic consumers to seven-eighths of their annual requirements. Consumers of hard coal throughout the country will be subject to the elastic restrictions but coke users will be affected only if they live in the twelve northeastern states and the District of Columbia.

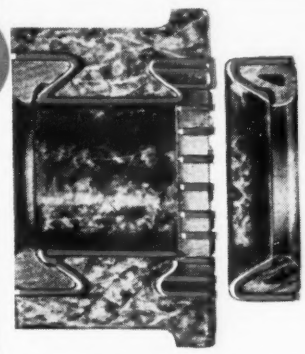
Consumer declarations, to be filed with dealers, will state the quantities of fuel on hand April 1, which will be deducted from the permissible tonnage for space and hot-water heating and domestic cooking. They also will give the number of rooms to be heated and the type of equipment in service.

Consumers who normally buy their fuel during the summer may have half of their total needs, minus the quantity on hand, delivered between April 1 and Oct. 1. If they choose bituminous coal or briquets as supplementary fuel, they may buy half of their requirements in hard coal or coke and the remainder in the substitutes. Under a provision for emergencies, retailers are required to give preference in deliveries to consumers with less than five days' supply of usable solid fuels on hand, but at the same time are prohibited from giving preferential treatment among consumers equally entitled to deliveries.

"This is a rush order—we're taking a short-cut to Gumption!"

4 WAYS that KEYSTONE Ball Bearing END BELLS Prolong D. C. Motor Life . . .

1



NO OIL PENETRATES MICA INSULATION

Much of your motor expense results from Sleeve Bearings . . . from the wear that occurs in them, and from their continuous leakage of oil. Here's how KEYSTONE Ball Bearing End Bells check these troubles:

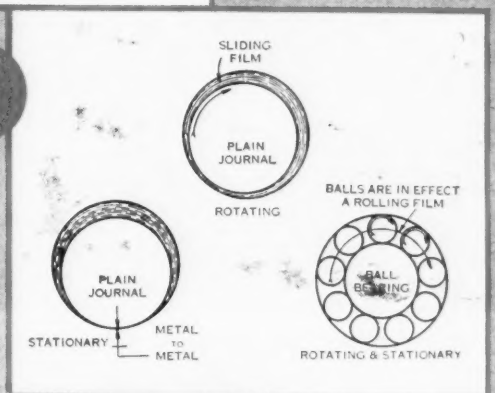
1. Oil collects on commutator between the front and back mica V-rings. This film of oil causes carbon dust (which is the natural result of brush wear) to adhere and to bridge the mica insulation. As this carbon dust accumulates it tends to burn slowly, causing the mica to carbonize and eventually the insulation to break down either to ground or between commutator bars. Result—motor failure.
2. On both A.C. and D.C. motors KEYSTONE Ball Bearing End Bells, lubricated with grease, retain their lubricant and stop troubles due to oil and dust accumulating on coils, or constricting ventilation ducts.
3. Shaft cannot wear when provided with ball bearings. This stops costly shaft renewals and trouble No. (1).
4. No need for frequent inspection, as required by sleeve bearings. Also much less frequent lubrication.

KEYSTONE End Bells with Ball Bearings come to you ready to install. They fit your motor—just give us the motor nameplate data. You use the old shaft. Let us tell you the whole story—including the ECONOMY of KEYSTONE.

Write for the Descriptive Folder

2 **STOPS Oil Collecting on Coils and in Air Ducts and Stopping Ventilation**

3



Equipped with FAFNIR ball bearings
BY KEYSTONE ELECT. CO. BALTIMORE MARYLAND
NO. 10Z1000

4 **STOPS Need for Frequent INSPECTION to Determine Oil Level and Bearing Wear**

KEYSTONE *Electric Company*
1224 RIDGELY STREET . . . BALTIMORE . . . MD.

A.M.C. to Hold 2-Day War Conference

Coal production for record war demands is the theme of the 1944 meeting of the American Mining Congress, to be held May 1 and 2 at the Netherland-Plaza Hotel, Cincinnati, Ohio. Sessions will be held morning and afternoon each day to discuss problems of coal production—bituminous and anthracite—from deep mines and open pits. Under the national chairmanship of Charles Dorrance, president, West Virginia Coal & Coke Corp., the program committee made plans for the conference at a series of district meetings held during February in Terre Haute, Chicago, Pittsburgh, Lexington, Ky., and Clarksburg, W. Va., where it was agreed that the procedure of the last two years would be followed again.

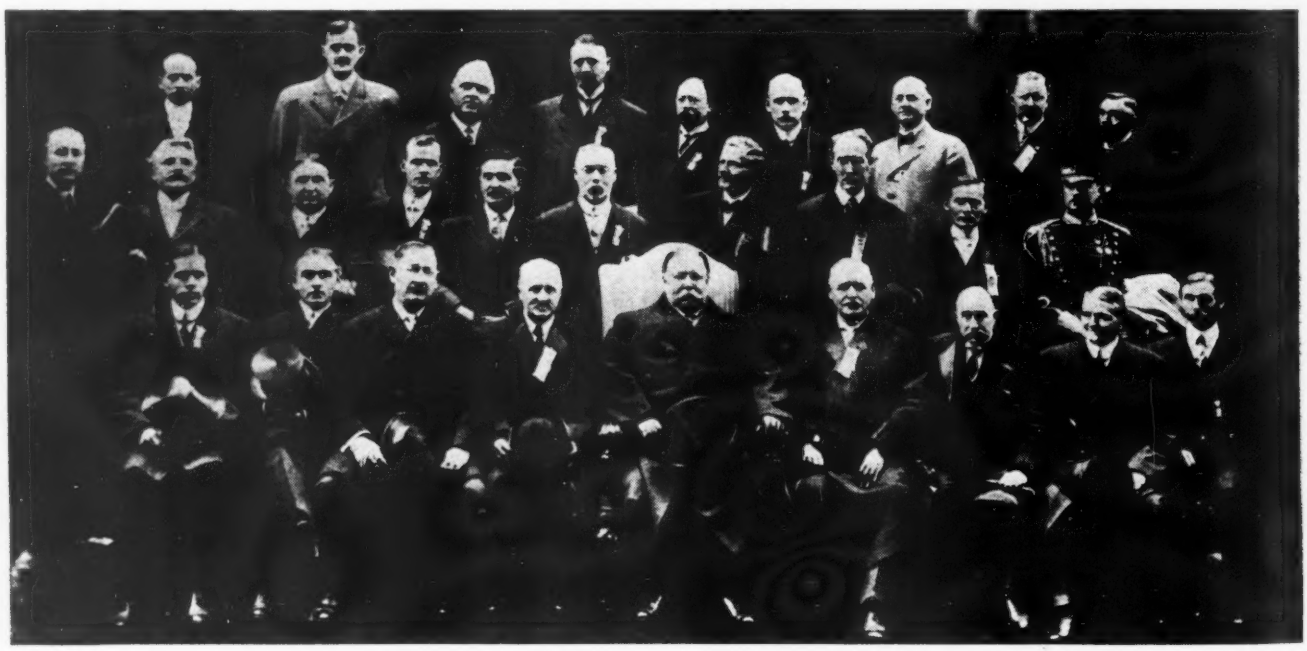
There will be general sessions for subjects applying to all branches of coal mining as well as separate sessions for strip mining and for special phases of deep mining. In addition, luncheon meetings each day will feature discussions on topics of broad interest to the industry, and at the annual dinner in the evening of the second day there will be a speaker of national prominence.

As no new machines have been designed since Pearl Harbor the coal industry's big job has been to speed up production to unprecedented heights with 1941 and older models. In spite of equipment and labor handicaps, this job is being done. While some of the methods are strictly war improvisations and others will have a post-war use, in either case the way in which record tonnage is being mined will be the underlying theme of the Cincinnati conference.

The State chairmen active in the district meetings held to plan the conference include: Alabama—C. E. Butt, Alabama Power Co.; Illinois—F. S. Pfahler, president, Superior Coal Co. Indiana—P. L. Donie, vice president, Mariah Hill Super Block Coal Co.; Kentucky—J. F. Bryson, Harlan County Coal Operators' Association; Ohio—L. J. Lorms, general manager, Lorain Coal & Dock Co.; Pennsylvania (anthracite)—Evan Evans Jr., vice president, Lehigh Navigation Coal Co.; Pennsylvania (bituminous)—Charles B. Baton, consulting mining engineer, Pittsburgh; Rocky Mountain district—Alex Grant, general superintendent, Rocky Mountain Fuel Co.; strip mining—Hugh B. Lee, vice president, Maumee Collieries Co., Terre Haute, Ind.; Virginia—H. W. Meador, vice president, Stonega Coke & Coal Co.; West Virginia—W. L. Doolittle, vice president, Consolidation Coal Co.

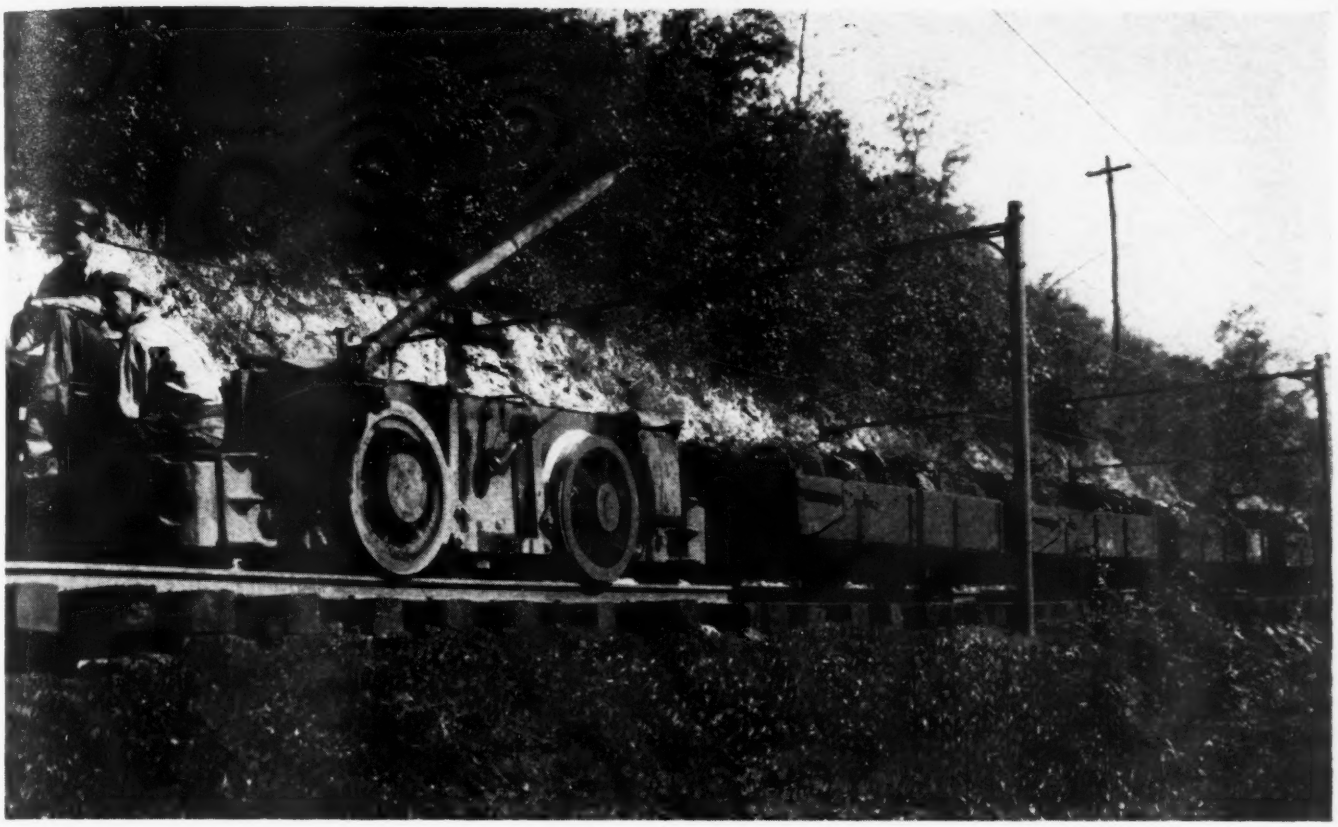
The preliminary program follows: May 1, morning—bituminous research, post-war planning. May 1, afternoon (deep mining session)—management and supervision, mine ventilation, safety. Strip mining session—drilling and shooting, haulage. May 2, morning (Session A)—conservation of fuel, coal preparation, complete seam vs. selective mining. Session B—thin-seam mining, handling rock with conveyors, high tonnage with conveyors. May 2, afternoon (deep mining)— machine maintenance, mechanical loaders increase production, gathering haulage. Strip mining—drainage for open-pit mining, production engineering.

At luncheon on both days of the conference there will be addresses on the present status and outlook for coal mining and on our world-wide military situation. The Manufacturers' Division will hold its annual meeting on the afternoon of the first day, when a brief business session will be followed by an open round-table.

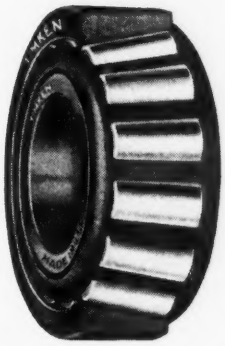


LEADERS IN THE AMERICAN MINING CONGRESS IN ITS EARLY DAYS

This picture, unearthed by Carl Scholz, consulting engineer, Charleston, W. Va., shows the reception committee, with President Taft, at the 1911 convention of the American Mining Congress, held in Chicago, Oct. 24-28. Front row (left to right): Charles Piez, president, Link-Belt Co.; Charles Moderwell, president, Moderwell Coal Co., now assistant to the president of the Chicago, Wilmington & Franklin Coal Co.; Harry Taylor, president, Taylor & Cavanaugh Coal Co.; Samuel Taylor, consulting engineer, Pittsburgh, Pa.; President William Howard Taft; John Dern, of the copper mining industry, then president of the American Mining Congress; John Hays Hammond, consulting engineer; Charles Dering, Chicago Chamber of Commerce; Dr. Joseph A. Holmes, director, U. S. Bureau of Mines. Second row: Glen Traer, president, Traer Coal Co.; John Ede, owner, Ede Coal Co.; Charles Smith, treasurer, Nason Coal Co.; Ira Clemens, president, Clemens Coal Co.; George Otis Smith, head, U. S. Geological Survey; H. W. Hardinge, Hardinge Machinery Co.; James F. Callbreath, secretary, American Mining Congress; Dr. Buckley, Missouri School of Mines, Rolla; Mr. Scholz, then manager, mining and fuel department, Rock Island lines; Major Archibald Butt, military aide to President Taft. Back row: Third, Martin D. Foster, Representative from Illinois; seventh, Dr. H. H. Stoek, head of School of Mines, University of Illinois; Arthur Thatcher, consulting engineer (others unknown to editor). Major Butt reluctantly consented to President Taft's presence in the picture, which was taken in an alley back of Orchestra Hall, where the President spoke at 10 a.m. Oct. 28. While the picture was being snapped there was a policeman at each window opening to the alley—200 bluecoats in all. The neat background was painted in after the photo was snapped.



Economical Hauling means . .



TIMKEN BEARINGS

TO JACOBS FORK-POCAHONTAS COAL COMPANY

This photograph, made at the Squire, W. Va. mine of Jacobs Fork-Pocahontas Coal Company, shows some of the modern type steel cars—all equipped with Timken Tapered Roller Bearings—in use there. These cars have an average capacity of 4½ tons of coal apiece, although some carry from five to six tons.

The first lot of Timken Bearing Equipped cars went into operation at the Squire mine when it was opened in 1936. Additional cars have been purchased from time to time and at present there are 285 Timken Bearing Equipped cars in service.

So satisfactory has been this coal company's experience with these cars that they have declared Timken Bearings to be the only bearings acceptable to them for mine car service—and so have hundreds of other mine operators. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

"Please ask the outer office not to use our samples as paper weights."

Preparation Group Organizes in Indiana

The Indiana Coal Preparation and Utilization Society was organized at a meeting March 10 at the Deming Hotel, Terre Haute, following preliminary meetings on Feb. 10 and 25. Regular sessions are to be held on the second Friday of each month to discuss problems and developments relating to the preparation and utilization of Indiana coals and will feature well-known speakers on pertinent subjects, with round-table conferences for exchange of ideas and experiences.

With the adoption of a constitution and by-laws March 10, officers were elected as follows: president, Paul W. F. J. Moran, Pyramid Coal Corp.; first vice president, G. F. Bieler, Snow Hill Coal Corp.; second vice president, Huge B. Lee, Jr., Maumee Collieries Co.; secretary-treasurer, Henry O. Erb, Coal Trade Association of Indiana; directors—W. C. Adams, Sunlight Coal Co.; Joe Ansted, Linton-Summit Coal Co.; Russell Bedwell, Princeton Mining Co.; J. S. Bond, Enos Coal Mining Co.; Louis W. Heck, Hickory Grove Coal Mining Corp.; C. C. Lydick, Coal Trade Association of Indiana; J. W. McDivitt, Ayrshire Patoka Collieries Corp.; James R. Mitten, Central Indiana Coal Co.; Max A. Tuttle, Knox Consolidated Coal Corp.; and G. F. Warnsman, Ingle Coal Corp., in addition to the officers.

Giant Tipple Planned For Omar Operation

A major improvement and expansion program is planned immediately by the West Virginia Coal & Coke Corp. at its operations at Omar, W. Va., it was announced March 18. According to C. B. Gleaves, assistant to President Charles Dorrance, the program will involve construction of the largest tipple in West Virginia, permitting the company to increase its output at Omar from 6,000 tons daily, its present level, to 10,000 tons.

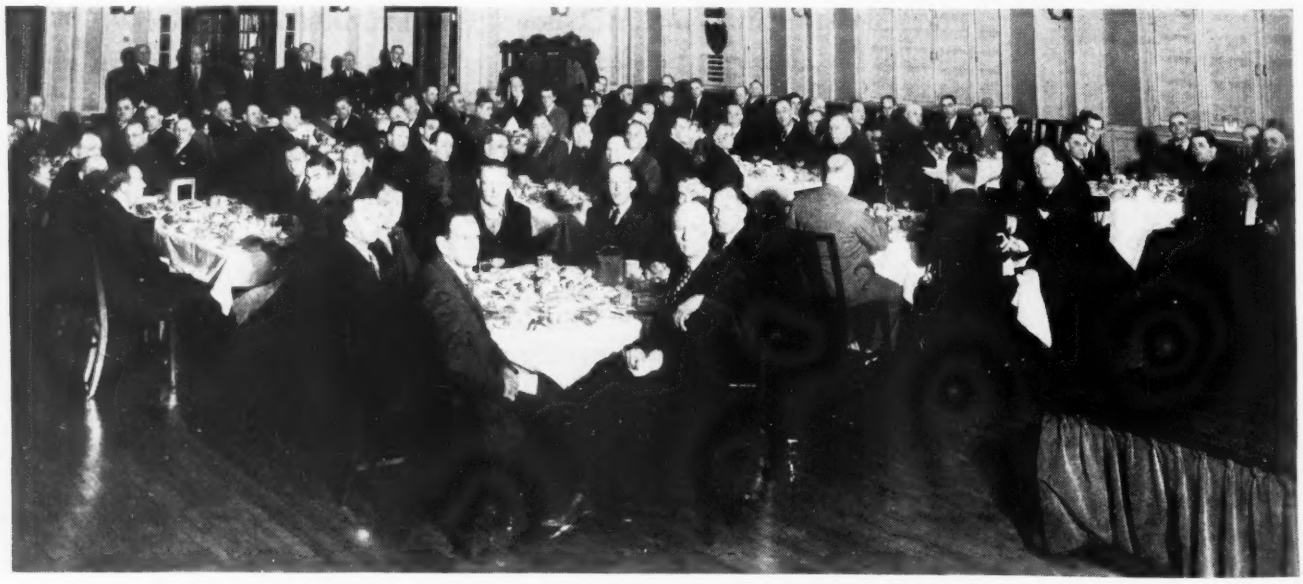
When the new tipple—control for which has been awarded to the Fairmont Machinery Co. and the necessary priorities for which have been granted by the War Production Board—has been completed, in the second quarter of 1945, all coal from the company's four mines in the Omar area will be prepared there.

•

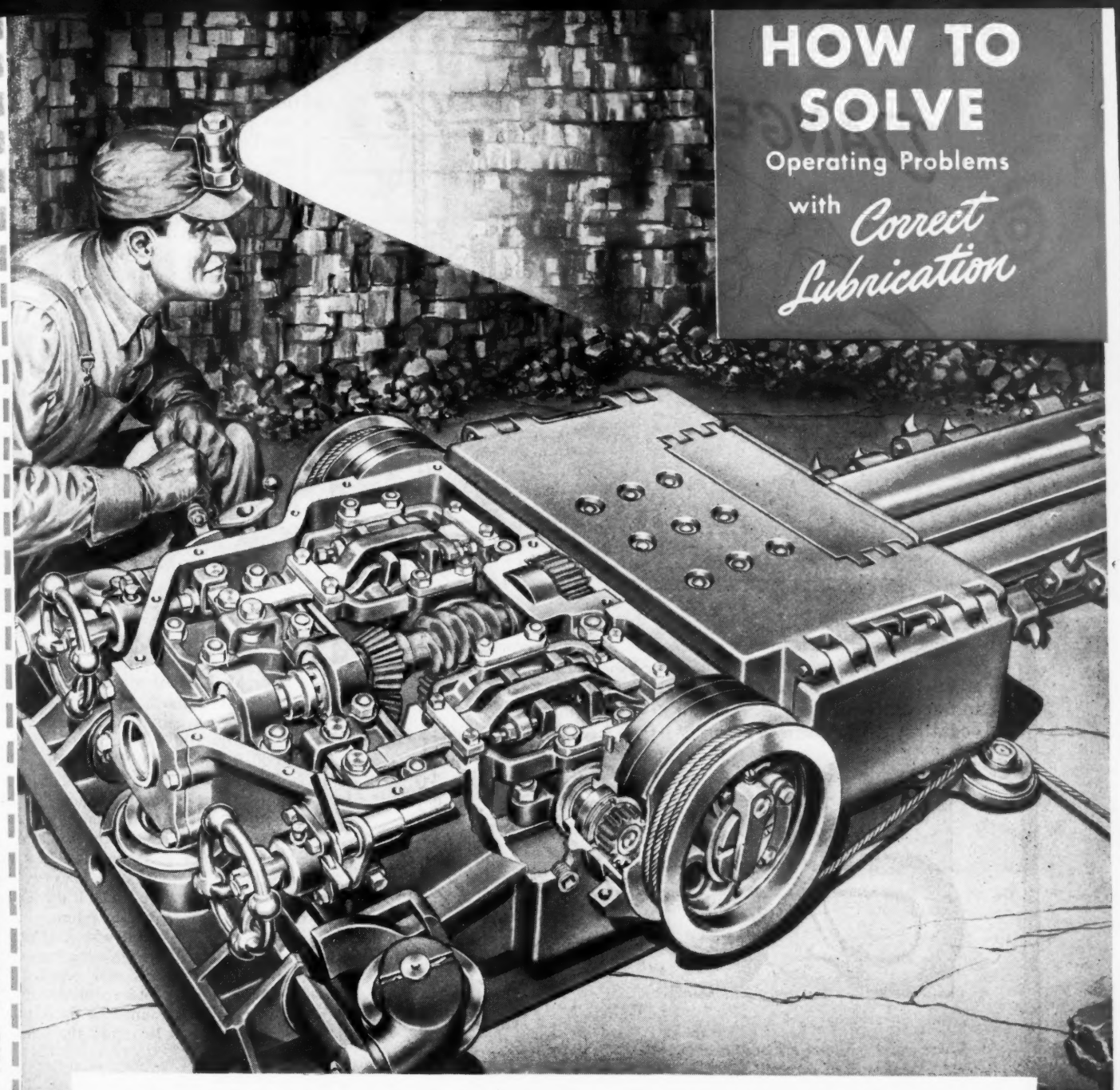
Blue Diamond Starts Tennessee Project

A new name—Royal Blue—is soon to be added to the list of eastern Tennessee producers by the Blue Diamond Coal Co. Approximately 8,000 acres of coal lands has recently been acquired from the East Tennessee Coal & Iron Co., one of the State's oldest and largest mine operators. The property is in Campbell County 7 miles northwest of the town of Caryville. The Southern Ry. is utilizing a narrow mountain valley, or gap, to gain access to the property. Present plans call for a complete town site having all modern facilities such as schools, churches, stores and recreational center for 2,500 workers. The homes will range from four to eight rooms in size.

The project climaxes three years of exploration, negotiation and acquisition of the last large body of coal remaining in the famous Jellico seam in Tennessee. This deposit has been mined by Blue Diamond and its predecessors for about 30 years.



Organization Meeting, Indiana Coal Preparation and Utilization Society



HOW TO SOLVE

Operating Problems with *Correct Lubrication*

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

Guard these Gears against Jolts!

GEAR LIFE in a coal cutter is just one jolt after another. To protect your gears and prevent costly, time-consuming repairs, you've got to have an oil with a strong film that can take constant shocks without rupture.

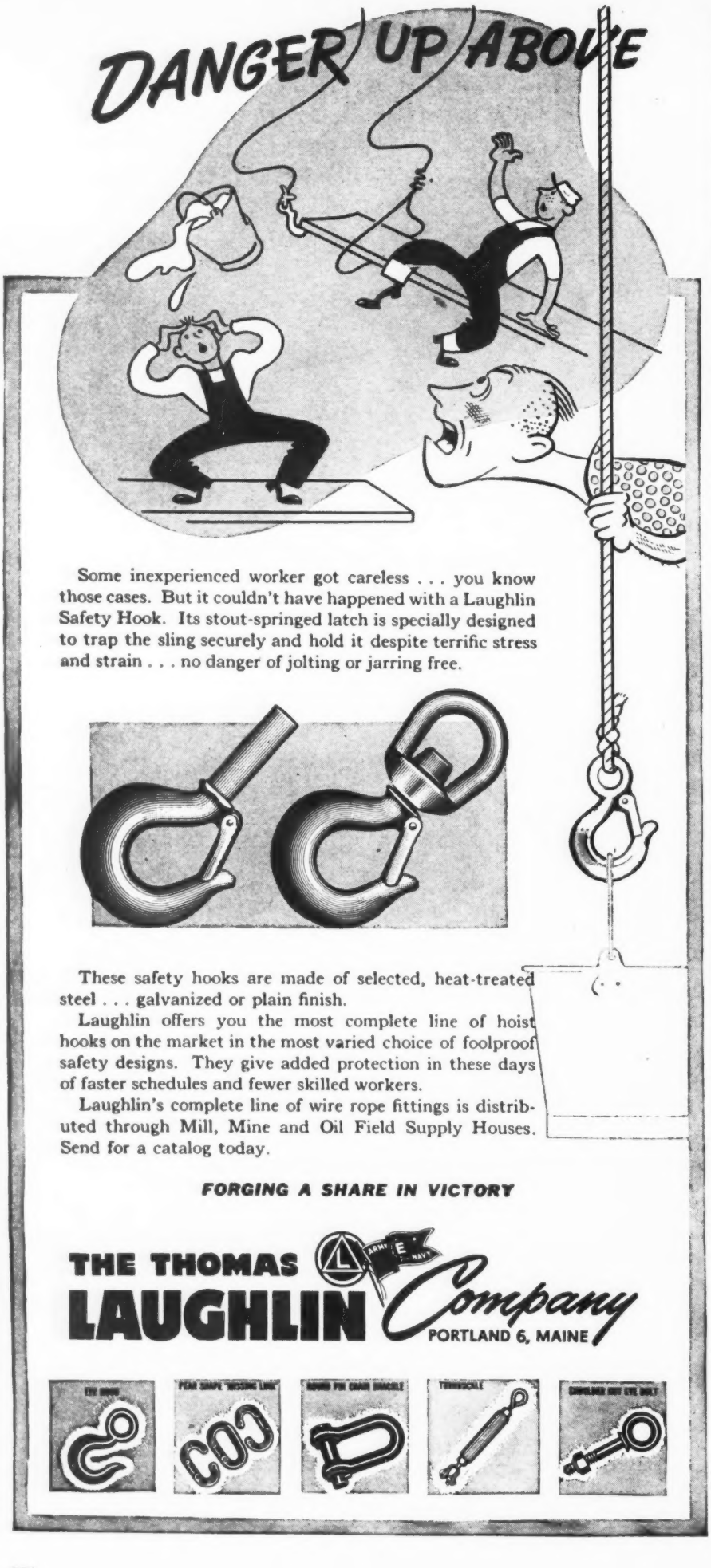
Gargoyle Vactra Oil AA answers this special coal cutter need. It stands up under continuous jolting loads and comes back for more.

Get this shock-proof oil for your cutter from the Socony-Vacuum Man when he calls. And remember, he's backed by 78 years of lubricating experience—the greatest in the world. He'll help you select the most efficient oil or grease to maintain capacity production with minimum maintenance on every piece of equipment you operate.

GARGOYLE Lubricants

SOCONY-VACUUM OIL CO., INC., Standard Oil of N.Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. • White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California.

CALL IN SOCONY-VACUUM



Some inexperienced worker got careless . . . you know those cases. But it couldn't have happened with a Laughlin Safety Hook. Its stout-springed latch is specially designed to trap the sling securely and hold it despite terrific stress and strain . . . no danger of jolting or jarring free.

These safety hooks are made of selected, heat-treated steel . . . galvanized or plain finish.

Laughlin offers you the most complete line of hoist hooks on the market in the most varied choice of foolproof safety designs. They give added protection in these days of faster schedules and fewer skilled workers.

Laughlin's complete line of wire rope fittings is distributed through Mill, Mine and Oil Field Supply Houses. Send for a catalog today.

FORGING A SHARE IN VICTORY

THE THOMAS LAUGHLIN Company
PORTLAND 6, MAINE

The district has been a consistent producer ever since entry to the field by the two prominent rail lines of the South—the Louisville & Nashville and the Southern.

The new development will closely match the capacity of the largest producer in Tennessee and may outrank the output of Blue Diamond's Eagan and Westbourne Jellico-seam mines. The mine will be a drift operation and will be completely equipped with modern machinery for maximum efficiency. Plans call for production within a year.

In addition to its other Tennessee properties Blue Diamond also produces in eastern Kentucky and Virginia. It now operates ten mines with three others expected to go into production in the not too distant future. They are: Leatherwood, in Perry County, Kentucky; Pathfork, in Harlan County, Kentucky, and the new Royal Blue, now under construction.

•

Strikers Drift Back To British Mines

Idle Welsh coal miners began drifting back to work March 13 after a strike that began a week earlier, spreading in waves until nearly 100,000 men were out—over 90,000 in Wales, 2,000 in Durham, England, and 7,000 in Ayrshire, Scotland. In voting on the issue of returning to work, March 12, one-third reluctantly consented to resume at once, one-third rejected all pleas to return and the remainder were undecided. Two days later, however, more than 70 percent were back on the job and the rest were expected to return within a few days. Some of those who went back to work the day after the vote was taken changed their minds and rejoined idle friends, confusing the situation. Eighty-five percent had resumed by the 15th and the rest promised to return the following day.

While the motives behind the strike were somewhat obscure, the ostensible reason for the walkout was dissatisfaction by skilled miners with the Porter commission award whereby the minimum pay—covering lower grade workers—was raised to £5 weekly, leaving the piece rates unchanged. Other points of difference included cancellation of the bonus previously paid to workers subjected to bad conditions such as standing in water while at work or breathing coal dust, in addition to having payment deducted from their wages for coal that they formerly were permitted to take home without charge. It was said that they were annoyed not so much by the amount taken but by the idea of having it deducted.

One point at issue was settled when Gwilym Lloyd George, Minister of Fuel, accepted an agreement between the miners and operators, March 8, permitting extra pay for those working in excessive dust and water.

Beginning March 13 strict coal rationing went into effect, consumers receiving 200 lb. to last until the end of the month, the lowest figure on record, according to

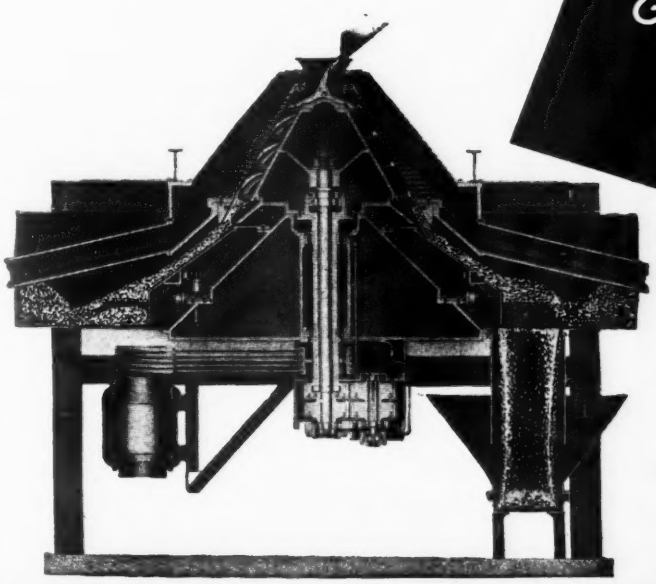
Increase YOUR OUTPUT BY MAKING THE *fine* SIZES USABLE

★ The "C-M-I" Dryer may be so arranged that little or none of the finest sizes are lost as you economically dewater fine coals. Another arrangement provides for the disposal of the finely divided clay and ash particles with the effluent.

Sludge and slurry coals can, when reclaimed, be used for special purposes, or mixed with the larger sizes. The good carbon in the sludge may be dried and saved by use of a closed system.

• Takes little room — easy to install — increases output — saves money — conserves materials—power—time.

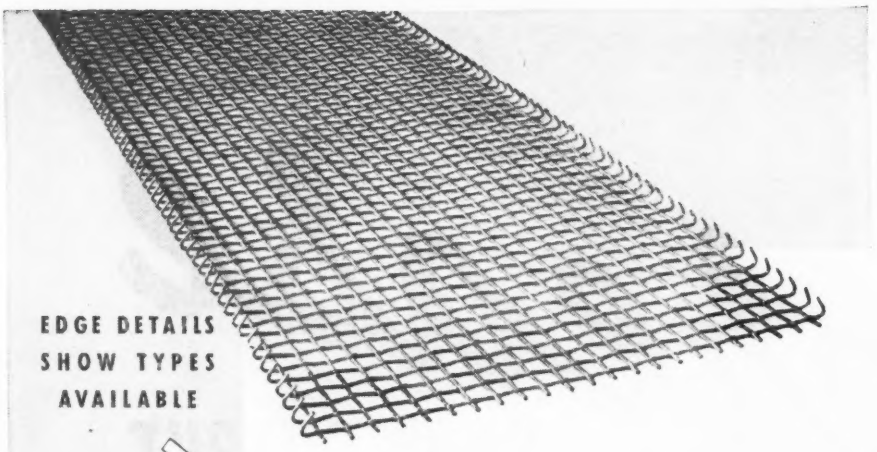
"C-M-I" Continuous Centrifugal DRYER



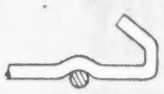
• The coal produced is dried to a non-freezing moisture content.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

SECOND AND PRESIDENT STREETS ST. LOUIS, MO.



EDGE DETAILS SHOW TYPES AVAILABLE

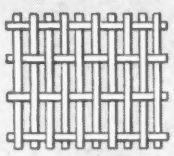


Type 1: Turned Edge. (Illustrated above).

Type 2: Metal Reinforced Edge.

Type 3: Double Metal Reinforced Edge.

Type 4: Square Bar.



Above — two types from the wide list of Roebling Wire Screen Weaves available.

Top: rectangular mesh.

Lower: square mesh.

MADE TO YOUR EXACT SPECIFICATIONS *Vibrator Screens* with Turned or Metal-Reinforced Edges

Just tell us what your specifications are—and we'll *make to-order* these Roebling woven wire screens to exactly meet your individual needs. Any type of edge shown, *at left*—any weave or mesh—wire diameter—kind of wire—you require.

Years of specialization — in both wire and screen making—give these Roebling wire screens their extra toughness and efficiency. Use this specialized experience to meet today's demand for accurately graded and cleaned coal.

Woven Wire Fabrics Division

JOHN A. ROEBLING'S SONS COMPANY

TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

ROEBLING

PACEMAKER IN WIRE PRODUCTS

WIRE ROPE AND STRAND • FITTINGS • AERIAL WIRE ROPE SYSTEMS • SUSPENSION BRIDGES AND CABLES • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING • AIRCORD, SWAGED TERMINALS AND ASSEMBLIES

William Jones, district controller of the Ministry of Fuel and Power. Average consumption runs about 1,000 lb. per month, 200 being needed weekly for cooking and water heating alone in the combined oven plate popular in Britain.

A renewal of labor difficulties occurred March 21 when 15,000 Yorkshire miners walked out in a wage dispute and closed eight collieries. Seven plants in South Yorkshire closed when miners struck in protest against the new deduction of 3s. 6d. weekly for home coal included in the Porter minimum-wage award. Strikers in at least four of the collieries refused to return pending joint discussions of the grievance. Two thousand miners at the Bullcroft main colliery near Doncaster struck when a youth raised a dispute concerning application of the Porter award.

The Yorkshire walkout, which spread to 28 mines and affected 60,000 workers, neared settlement with ratification, March 26, of an agreement reached the day previous between the Fuel Ministry and mine owners. The agreement, which stabilizes coal workers' wages until Dec. 31, 1947, provides a wage differential of 20c. a shift for skilled workers and incentives to increase production by piece workers, besides lifting deductions from the minimum wage for coal taken to heat the miners' homes.

•

Ickes Backs New Pact For Hard Coal Men

A contract between anthracite operators and the United Mine Workers of America seemed near March 13, after many months of negotiation, when a 13-man joint negotiating committee met in New York City to study the report of a three-member subcommittee that had recently prepared a draft of a wage agreement. The proposed new agreement was submitted March 9 to the War Labor Board, and Secretary Ickes, as Fuel Administrator, strongly urged its approval by the Board.

Reported to meet nearly all the miners' demands, the new pact provides for payment of 37.8c. additional daily compensation for trimming 15 minutes from the miners' lunch period besides the 32.2c. per day increase already approved by WLB and included in the so-called Ickes-Lewis agreement under which the men have been working since Nov. 3 under government control.

The formula for continuous-shift or maintenance worker is eliminated and operators are authorized to cut their work week from seven to six days if replacements locally are available. Their pay will be $1.046 an hour, plus 37.8c. a day, with time and a half after 40 hours. Under this arrangement they will receive 60c. more for a six-day week than they are paid now under the seven-day week.

Miners who have been paying tool rentals will be reimbursed. Those who have been receiving an allowance for using their own tools also are to be protected.

If approved by WLB, the contract will be operative until April 30, 1945, or longer if the war lasts beyond that date. Also the mines will be turned back to

"...not one single shut-down with RING-FREE"

Quoting the WILMINGTON COAL MINING CORP., Morris, Illinois: "...through dust, sand and mud in all sorts of weather, operating 24 hours a day in 3 shifts—we have not had one single shut-down as a result of stuck rings or valves, since we adopted RING-FREE. We have proven in this extremely difficult operation that RING-FREE'S ability to penetrate rapidly to tightly fitted valve stems and rings and to resist high temperatures, as well as the sludging effect generally caused by cold weather work, places it far above any lubricant we have had before."

Strippers and other motorized equipment (gasoline and Diesel) give performance you're proud of when lubricated with Macmillan RING-FREE Motor Oil. They deliver more usable power—dependable power—under toughest operating conditions because RING-FREE reduces friction *fast!*

And Macmillan RING-FREE *removes* carbon while your engine runs! Changing to RING-FREE means getting a motor that has to run sweeter as it benefits fully from rapid, thorough penetration. You get high film strength, high heat resistance and long cling from RING-FREE.

Macmillan representatives welcome your trial and comparison of RING-FREE on the basis of complete records of operating performance and economy!

MACMILLAN PETROLEUM CORPORATION

50 W. 50th Street, New York 20 • 624 S. Michigan Avenue, Chicago 5 • 530 W. 6th Street, Los Angeles 14

Copyright 1944, Macmillan Petroleum Corp.

MACMILLAN RING-FREE MOTOR OIL

REDUCES WEAR BY REDUCING FRICTION

IDENTICAL TWINS

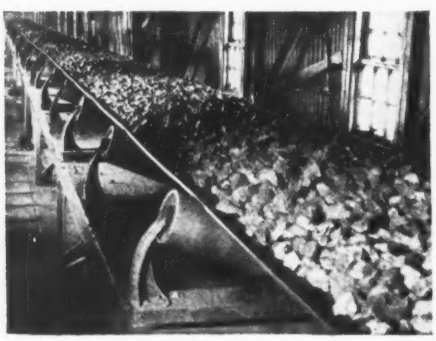
ARE RARE IN CONVEYOR BELTS

Every conveyor belt installation is considered an individual problem by United States Rubber Belt Engineers. Each belt is engineered on the basis of the type and amount of material to be handled, distance traveled, speed, changing elevations and other factors.

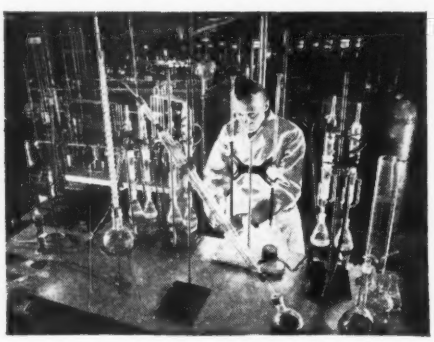
Right now, the full force of this broad range experience is brought to bear on the problems of engineering conveyor belts of synthetic rubber.

During the last six years, United States Rubber Belt Engineers have successfully designed and manufactured belts of synthetic rubber to meet a variety of *special* conditions. This experience is proving of incalculable value, now that synthetic rubber belts are a "must." *We invite you to submit your questions and problems relating to conveyor belts for your individual operations.*

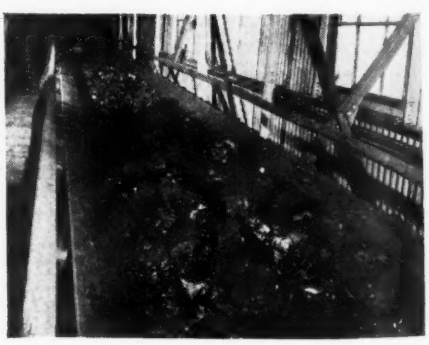
SERVING THROUGH SCIENCE



U. S. SYNTHETIC RUBBER BELT conveying highly abrasive oil-sprayed coke. This 680-ft. belt, in successful operation for 4 years, is still in excellent condition. Its perfect alignment under capacity loads reflects U. S. Staff Engineering.



LABORATORIES ALWAYS AT YOUR SERVICE. U. S. Belts are engineered by men who understand conveyor belt operation problems and know how to compound synthetic rubber for successful fabrication in conveyor belts.



SLOPE BELT SAME LENGTH as the "Twins" shown above—but differs in width, number of plies and other design features. However, U. S. Belts are alike in one respect . . . all are engineered for flexibility and perfect alignment.

Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

private operation if the pact receives WLB sanction.

Protecting the union against a possible change in the national stabilization policy is a clause stating that if at any time during the term of the agreement "a significant change occurs in the government wage policy either party shall have the right to request negotiations on general wage rates."

•

Ask National Policy For Coal in Canada

Maintaining that establishment of a national fuel policy is urgently needed to insure the future of the coal industry in Canada, officers of District 26, United Mine Workers, have asked the Nova Scotia Government to press federal authorities for establishment of such a policy as soon as possible. District President Freeman Jenkins said the coal industry "has been the most neglected industry" in Canada.

Preliminary steps are being taken to send a joint delegation to Ottawa to urge federal action to alleviate the coal situation in Alberta, N. E. Tanner, Alberta Minister of Lands and Mines, has stated. Mr. Tanner said letters are being sent to operators and miners in regard to naming representatives to accompany a government member of the delegation to Ottawa.

Faced with reports that coal subsidies may be withdrawn or curtailed this spring, western Canadian operators are urging Ottawa that there be either a return to competitive conditions where increased costs can be passed on to the consumer, or maintenance of the present subsidy. It was reported that subsidies to lignite operators in Edmonton would be withdrawn March 31. Grants made following the increase in mine wages last November are to end, the report said, and the Edmonton operators wired Ottawa urging maintenance of the subsidy until satisfactory plans can be formulated. Other areas in western Canada likewise are threatened with either curtailment or total withdrawal of subsidies, and the operators assert these subsidies were granted to compensate for increasing wage and other costs. Because of coal price ceilings, higher costs cannot be passed on to the consumer in higher prices, as was done in the past, it is pointed out.

Selective Service restrictions on coal miners taking work outside the mines are being temporarily relaxed in the Drumheller field of Alberta because of waning production, Labor Department officials reported March 1.

The Alberta Legislature has unanimously approved a resolution demanding that the Dominion Government formulate and announce a national coal policy. It directed that a committee representing the government, miners and operators go to Ottawa to urge on Dominion authorities the necessity of taking appropriate action immediately. Premier E. C. Manning said the government is prepared to carry out the principles of the resolution.

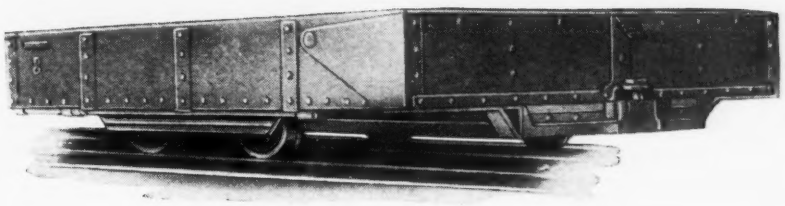
Douglas Abbott, parliamentary assistant to J. L. Ilsley, Minister of Finance, said in the Canadian House of Commons March

Steelcar

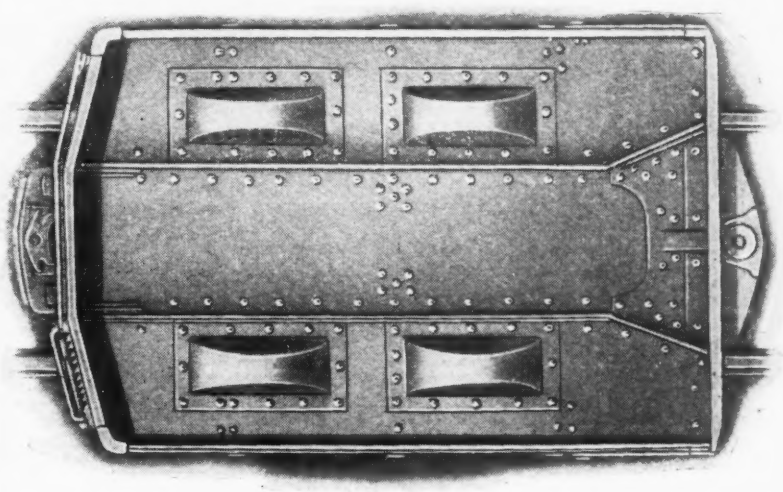
MODERN

STEEL COAL MINE CARS

BUILT TO MEET YOUR REQUIREMENTS



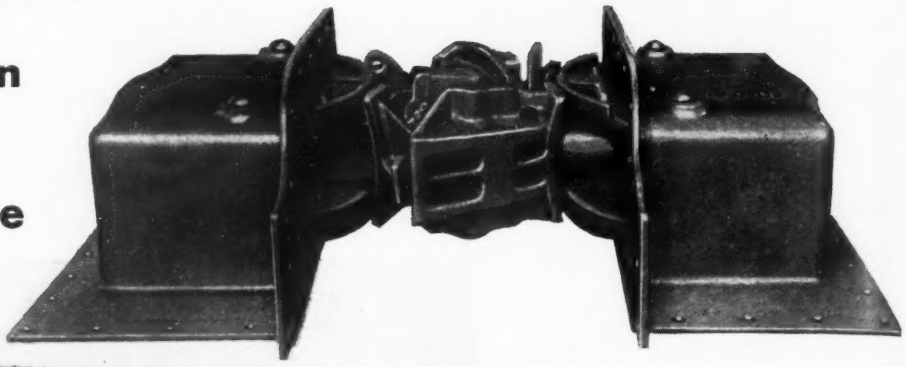
Modern, all-steel construction cars—designed to provide greater cubic capacity for your present clearances. Descriptive bulletin and complete specifications sent on request.

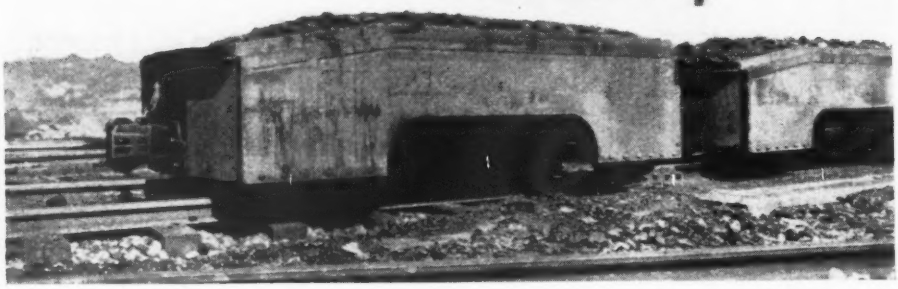


PRESSED STEEL CAR COMPANY, INC.
INDUSTRIAL DIVISION
PITTSBURGH, PA.

WILLISON Automatic Couplers

Increase Production
Reduce Accidents
Lower Maintenance





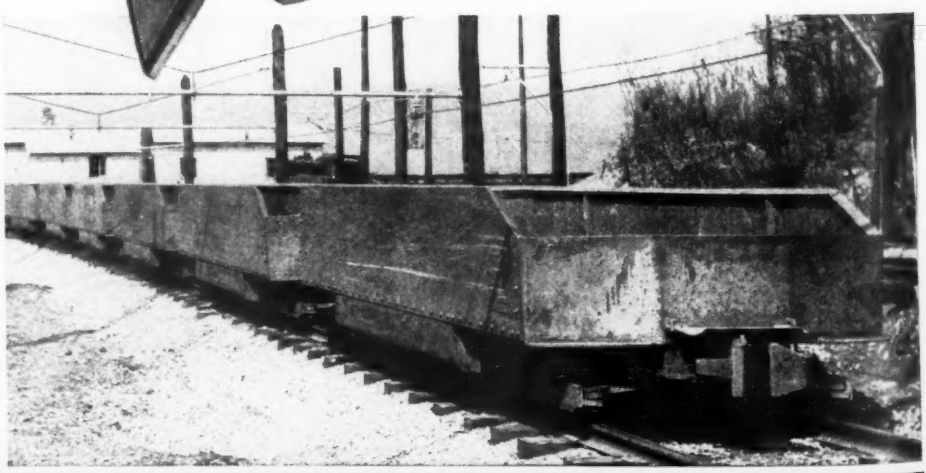
Improved type of spring cushioned mounting for long four wheel cars
(two coupled)

For rapid and safe handling of larger capacity cars used in modern mechanized mines · · · Willison Automatic Couplers is the answer.

Safety in coupling & uncoupling
Faster shunting of cars
Higher speed haulage
Less spillage of coal
Rotary dumping in train

Willison Coupler
and
Draft Gear
for large capacity
8 wheel cars

Get Circular No. 5240 for complete details.



NATIONAL MALLEABLE AND STEEL CASTINGS CO.
General Offices: CLEVELAND, OHIO
Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco.
Works: Cleveland Chicago Indianapolis Sharon Pa., Melrose Park, Ill.

9 Items to Check When Ordering Wire Rope

(Note: Every day, several orders are received which require correspondence and delay because of insufficient information.

Listed below are items which can be used as a wire rope specification check list. Because wire rope is a controlled material, CMP allocation or symbol, also certification, must be included before orders can be entered.)

WIRE ROPE CHECK LIST

Item	*Example*
1. Length	120 Feet
2. Diameter	¾ Inch
3. Number of Strands	6
4. Number of Wires per Strand	19
5. Lay	Right Lang Lay
6. Core	IWRC
7. Kind of Fabrication	PREformed
8. Grade	(Improved Plow Steel) Monarch Whyte Strand
9. Use	Make, Model of Equipment

(Plus . . . CMP allocation or symbol, also certification.)

Here are all these items for this order.

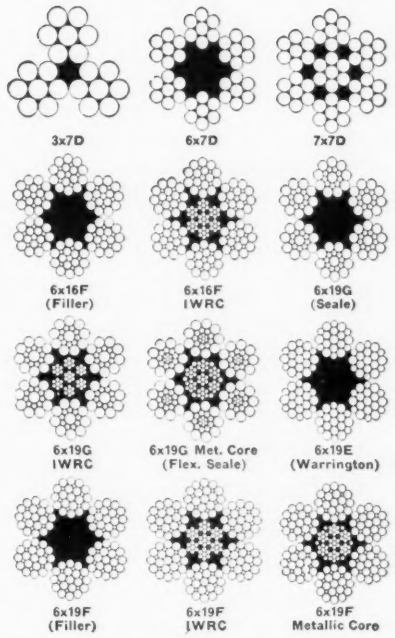
120 feet ¾-inch 6 x 19 Right Lang Lay with IWRC PREformed Monarch Whyte Strand Wire Rope, to be used for hoist line on Model 45 Lorain Skimmer.

Note: For more complete detailed information on how to specify wire rope, refer to Macwhyte G-15 Wire Rope Catalog, pages 89 to 101.

The above check list is normal and complete as to the specifying of wire rope in peacetime, but it is more important than ever in wartime when it is so difficult to get wire rope.

STATE USE FOR ROPE—IT HELPS

Always include the type of service for which the rope is wanted. Then if an error is made in listing the proper construction, or if our experience has shown a different construction gives better service for this purpose, we may be able to help you obtain a better rope. In some cases such information today, makes possible your getting a wire rope to meet your needs when the rope you specify is not available but a similar one is available that might do an even better job for you at no additional cost.



These are but a few wire rope constructions taken from our G-15 Wire Rope Catalog to indicate the vast number of types and constructions of wire rope that are made. As wire rope manufacturers, we are in a position to help wire rope users obtain the correct rope for their specific needs.

HOW TO MAKE SURE OF CORRECT ROPE FOR YOUR EQUIPMENT

There are hundreds of different sizes, grades, and constructions of wire rope. For many years we have cooperated with wire rope users to get the correct ropes for all kinds of equipment. We have watched these ropes give outstanding service on equipment like yours.

The benefit of that experience may help make your wire ropes last longer, or may help you in specifying what we believe is the finest wire rope you can buy — the *correct* rope for *your* equipment: Monarch Whyte Strand PREformed.

Monarch Whyte Strand PREformed has recorded outstanding service records because:

It's made from selected steels.

It's PREformed to reduce internal stresses and to fight rope fatigue.

It's internally lubricated to protect wires and strands against corrosion and friction.

MACWHYTE
PREformed
WIRE ROPE
***Plus* Internal Lubrication**
Selected Steels
Tested—Proved
The correct rope for your equipment

NO. 706

MACWHYTE COMPANY

ARMY (E) NAVY

WIRE ROPE MANUFACTURERS

The correct rope for your equipment

2931 *Fourteenth Avenue, Kenosha, Wisconsin*

Mill Depots: New York · Pittsburgh · Chicago · Fort Worth · Portland · Seattle · San Francisco. Distributors throughout the U.S.A.

MACWHYTE PREformed and Internally Lubricated Wire Rope · MONARCH WHYTE STRAND Wire Rope · MACWHYTE Special Traction Elevator Rope · MACWHYTE Braided Wire Rope Slings · MACWHYTE Aircraft Cables and Tie-Rods · MACWHYTE Stainless Steel Wire Rope · MACWHYTE Monel Metal Wire Rope

MOTHER NATURE'S COAL

is not good enough for Brazilian engineers

(Courtesy Companhia Siderurgica Nacional Tubáraro Brazil)

You are looking at a picture of a huge preparation plant—one of the world's largest—which will produce annually 1,500,000 tons of prepared coal.

For the third time McNally Pittsburg engineers have been called in by Brazilian engineers. The two former plants—Consorcio Administrador de Emprasas de Mineracao—in the Rio Grande do Sul basin were designed to produce domestic steam coals from non-coking coal.

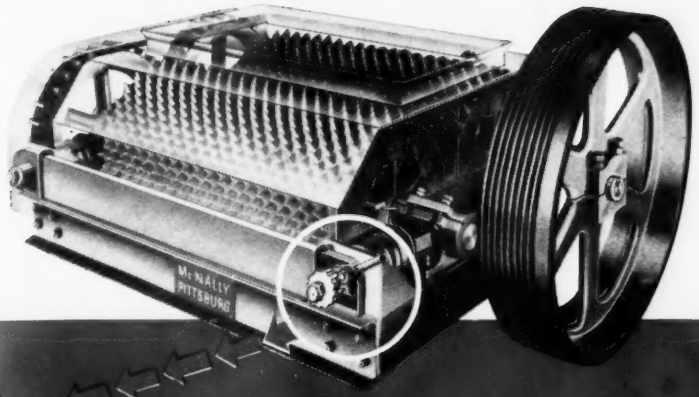
Now, on the third call, this latest development will produce metallurgical coal from raw coal from the Santa Catharina district which, when completely prepared, will coke readily. In addition to the metallurgical coal, about 35% of the tonnage will come out of the preparation plant as locomotive and steam coal, and a marketable tonnage of the residue supplies excellent fuel for electric generating stations.

Vision and courage prompted the Brazilians to erect this plant. The desire to take full advantage of their rich iron ore deposits, use their own coal, and make their steel development nationally independent constituted the challenge.

The specialized experience of McNally Pittsburg engineers is available anywhere in the world to coal producers who want to capture and stay in the rapidly growing market for prepared coal.

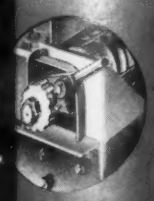
McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL



STOKER COAL CRUSHER

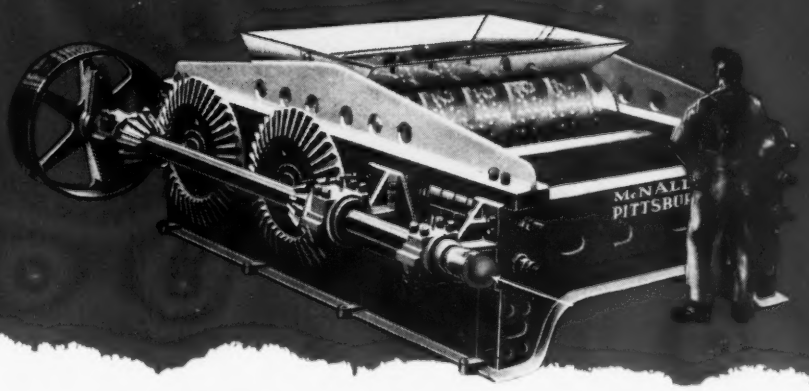
These crushers reduce egg and nut sizes to 1¼", 1", or ¾" with the lowest possible production of extreme fines in the finished product. The trend is toward smaller sizes . . . between 70% and 80% of bituminous coal sold today is below 2". Three types of crushers are available—light, standard, and heavy in 17 sizes. Complete data will be found in crusher bulletin number 442.



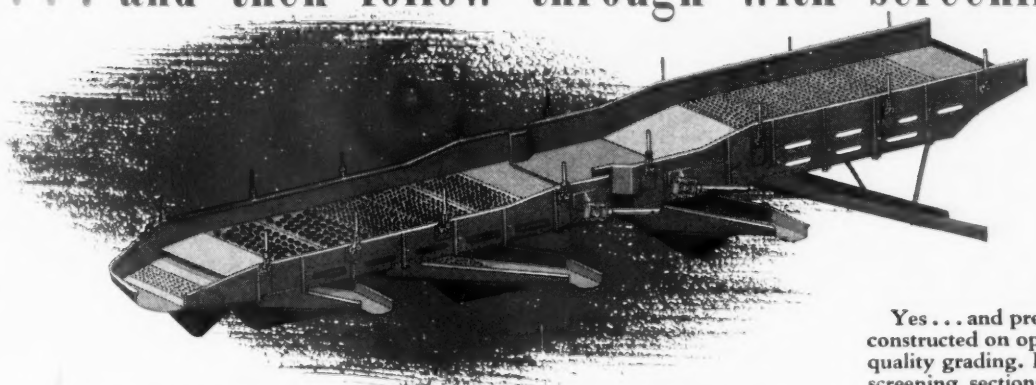
Many operators start improving their product with BETTER CRUSHERS

PRIMARY BREAKER

Run of mine coal can be fed into this breaker without pre-screening out under sizes. This will not add to the final degradation. Hand picking may be performed if desired, although even that is not necessary. Eight sizes of breakers are available, providing a crushed resultant from 6" to 20". Write for crusher bulletin number 442.



. . . and then follow through with screening equipment



Reproduction of Page Advertisement in May Fortune

The preparation plant illustrated on the opposite page, which was designed and erected by McNally Pittsburg, is equipped with all of the above. In addition to blending and storage bins, it is also equipped with McNally-Norton washers, McNally-Rheolaveur washers, McNally-Carpenter dryers, Door thickener and filter. Even a pilot flotation plant is included for experimental test purposes on possible recovery of every combustible atom.

Whether your plans call for additional equipment to your present plant or for an entirely new preparation plant, our engineers are at your service.

Yes . . . and present-day screens are designed and constructed on operating principles fundamental to quality grading. Efficient and economical multiple screening sections are combined with means for by-passing to lower decks for re-screening and by-product handling at a low operating cost. Illustration shows a 5-track screen with 3-deck upper section and 2-deck lower section. Gates are provided at the head of each chute. By closing the proper gates, any mix of sizes may be obtained or mine run loaded over the lump boom by closing all of the gates and without veiling the screen. Our engineers will gladly go over your property and submit a screening lay-out for your plant.

McNally Pittsburg Manufacturing Corporation, 307 N. Michigan Ave., Chicago 1, Ill. • Pittsburg, Kansas • Koppers Bldg., Pittsburgh 19, Pa.
Caixa Postal 1310, Rio de Janeiro, Brazil

IT'S THE POWER AND SPEED THAT COUNTS!

Koehring speed and power saves seconds in shovel operations . . . the surest way to increase production. Victory demands a greater output, and Koehring Shovels have the reserve power to provide it. The wartime service needed is available in your Koehring Shovel with little time out for breakdown or repair. Be sure to keep your shovel well lubricated . . . replace worn parts before failure . . . never misuse your shovel in any way . . . and it will exhibit a performance that counts in increasing production.

KOEHRING COMPANY
Milwaukee, Wisconsin

DEPEND ON YOUR KOEHRING DISTRIBUTOR
to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

McLANAHAN COAL CRUSHERS

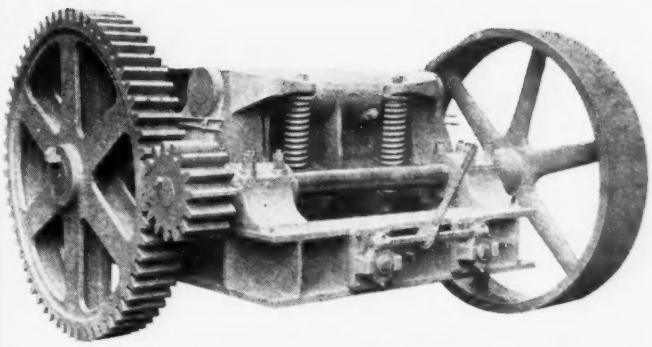
AID TODAY'S PEAK PRODUCTION!

The ever-increasing demand for stoker and other prepared coal sizes requires top performance by *your* crushers—they must be able to "take it."

McLanahan Crushers have the "built-in" stamina that handles *any* tonnage for *any* product and these proved units are constructed of steel, semi-steel or fabricated steel, with babbitt, bronze or roller bearings.

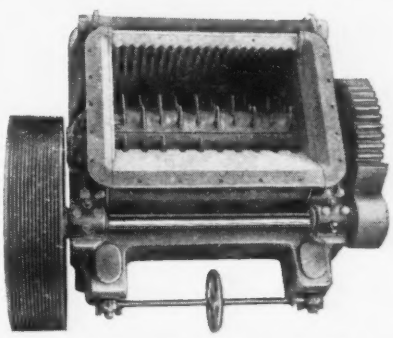
Patented solid or segment rolls . . . with or without automatic tramp iron protection . . . easily and quickly adjustable . . . of highest mechanical efficiency.

Have you the McLanahan data?



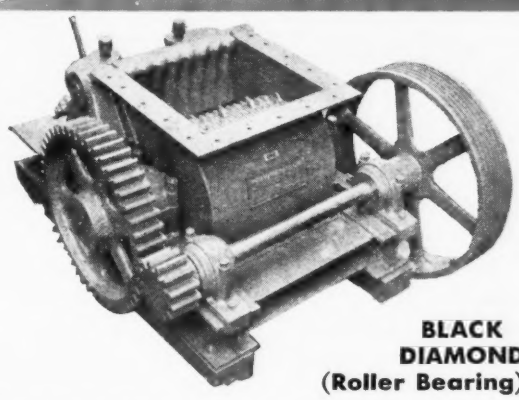
GIANT ROCK MASTER

An all-steel, automatic steel strut crusher, in any size or capacity for handling rock and mine refuse.



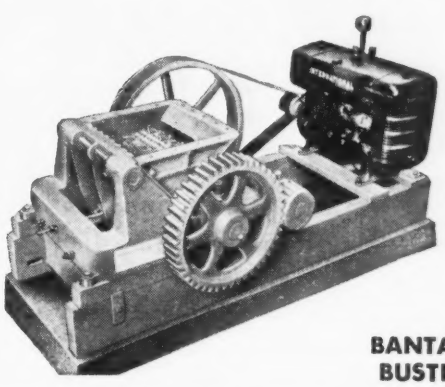
BLACK DIAMOND STEEL STRUT

A steel strut primary or secondary crusher . . . for cracking large or small lumps with a minimum of fines. Extensively used throughout anthracite and bituminous fields.



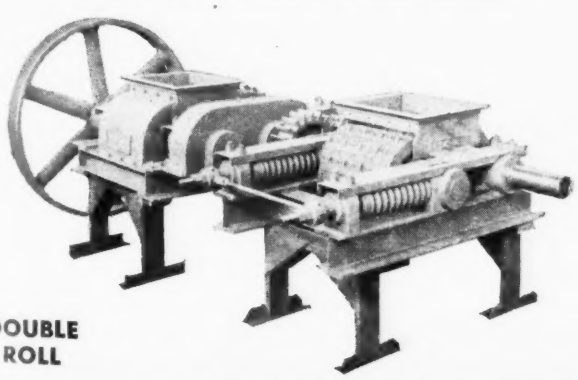
BLACK DIAMOND (Roller Bearing)

An all-steel, roller bearing unit, quick adjustment control and automatic steel and scrap iron protection. For limited headroom.



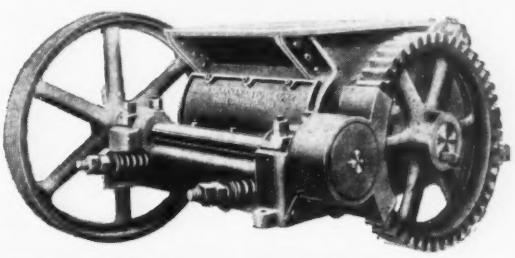
BANTAM BUSTER

The new Bantam Buster—a low price unit designed for truck mines and low capacity operations. With or without engine.



DOUBLE ROLL

Built with a rugged, heavy, all-steel frame. Tramp iron protection and easy adjustment.



BLACK DIAMOND (Conventional Type)

Low cost, conventional type of Black Diamond Single Bolt Adjustment Crusher built in one-piece frame. Spring Rod adjustment. Protection against tramp iron provided by shear pins in the pulley.

McLANAHAN AND STONE CORPORATION · HOLLIDAYSBURG, PA.

Originators of Single Roll Crushers

DETONITE'S MORE EFFICIENT ACTION MAKES OVERBURDEN EASIER TO REMOVE

A shovel may represent an investment of $500,000. When the explosive does not fully displace the overburden, costs increase and *everybody* suffers.

But no shovel has to do the work of the explosive when King's Detonite is on the job. Detonite is a slow-acting explosive—with a spreading, heaving action that lifts and displaces the overburden. Easier, faster digging with less wear and tear on costly equipment, hard to get and difficult to replace. Neither is Detonite too destructive immediately around the hole—it displaces the overburden without killing the coal.

Let us demonstrate this patented, surface-sensitized high explosive in your own mine—under your special operating conditions. The best way to fully appreciate Detonite's slow and efficient action is to use this superior explosive yourself.

See your King Powder man about Detonite—or get in touch with us directly by letter, wire or phone (MAin 4609, Cincinnati, and reverse charges). Arrange that demonstration date today!

WAR BONDS HELP WIN WARS—BUY MORE TODAY!

KING EXPLOSIVES

THE KING POWDER CO. INC.
CINCINNATI 1, OHIO . . . . . INCORPORATED 1878

21 that a price increase for Alberta coal authorized Dec. 1, 1943, is being continued. The permitted increase was 50c. a ton for regular mine-run coal; this will be reduced to 40c. April 1.

The Wartime Prices and Trade Board of Canada has permitted resumption of manufacture of screw-fed stokers in sizes small enough for household use. Up to March 1, stokers being manufactured were large sizes for offices and other buildings. It is understood that an improvement in the metal supply situation permitted relaxation of the restrictions.

•

Portal to Portal Pay Ruled for Iron Mines

The Fair Labor Standards Act requires portal to portal pay for iron-ore miners, the United States Supreme Court ruled March 28 in a 7 to 2 decision. Justice Frank Murphy, writing the majority opinion in the case of three Alabama iron-mining companies, upheld decisions by two lower courts favoring pay for underground travel. Dissenting views were held by Chief Justice Harlan F. Stone and Justice Owen J. Roberts, the latter writing the opinion.

There is little doubt that the decision will be construed as a precedent applying to the coal industry, which has two cases pending affecting portal-to-portal pay. Crampton Harris, Birmingham, Ala., counsel for the iron miners and who also represents the United Mine Workers, commented as follows on the decision: "There can be no differentiation between work in an iron-ore mine and work in a coal mine. The same law, the same principles, apply equally as regards travel time constituting work time, and in my opinion the decision in the iron-ore case will apply as the law of the land governing the work week in coal mines."

Justice Murphy held that the long rides taken by the men "in the dark and malodorous shafts and the exacting and dangerous conditions in the mine shafts stand as a mute, unanswerable proof that the journey from and to the portal involves continuous physical and mental exertion as well as hazards to life and limb. This compulsory travel," he proceeded, "occurs entirely on petitioners' property and is at all times under their strict control and supervision."

•

Bootleg Injunctions Near Settlement

Answers in the injunction cases against bootleg miners in the Pennsylvania anthracite region were coming in apace toward the end of March. The first Schuylkill County case, involving the Philadelphia & Reading Coal & Iron Co., raised questions of law, scheduled to be threshed out April 10. In the second Reading case, the injunction was continued and the defendants given 30 days to file an answer. The P. & R. Heckscherville and Trevorton cases were in the final stages of preparation for pre-

Modern Coal Production

INCREASES TONNAGE and DECREASES COSTS IN CLEANING PLANTS

UP-TO-DATE COAL CLEANING PLANTS *use the*

• MERRICK •

WEIGHTOMETER

MERRICK WEIGHTOMETERS applied to BELT CONVEYORS assure accurate and speedy automatic weighing for efficient and economical control of tonnage and cleaning plant operation. Leading large tonnage producers are effecting substantial savings by using WEIGHTOMETERS for purposes of indication, registration and recording in connection with these processes:

1—Weighing all mine production
2—Weighing all coal to washing plants
3—Weighing coal after cleaning
4—Weighing waste and rejects from cleaning plant
5—Checking tonnage payments

Chart recorders may be located at any point remote from WEIGHTOMETERS, which may be applied to any size belt conveyor, inclined or horizontal. The WEIGHTOMETERS give a simplified and dependable 24-hour day record of your production, without a weighman and without interrupting coal flow.

Short pivoted Weightometers equipped with a magnetic pulley may be used to separate tramp iron. Merrick Engineers are ready to show you how your mine can best profit from the use of Weightometers. We also manufacture the FEEDOWEIGHT which accurately weighs coal to a mixing conveyor, controls the rate of feed and continuously totalizes the weight delivered.

WRITE FOR BULLETIN 375

MERRICK SCALE MFG. CO.

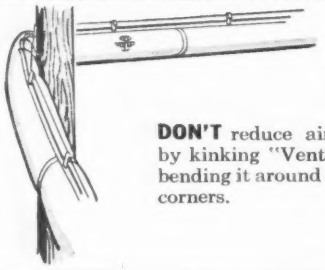
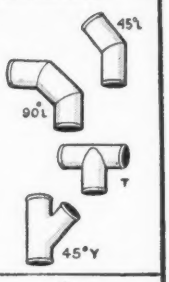
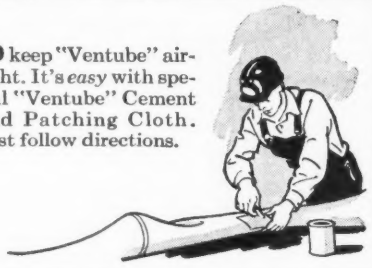
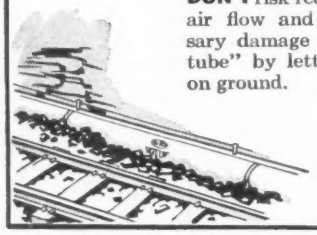
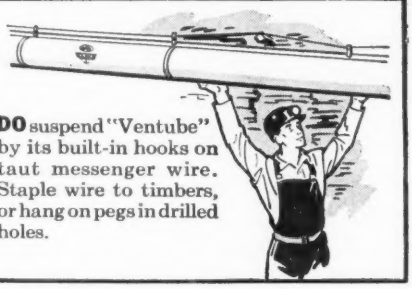
Passaic, N. J. U.S.A.

AVOID THESE COMMON MISTAKES IN USING TUBING

For efficiency and safety, use "Ventube"* right!

Properly used, blowers and tubing are important assets in many mines today. They carry adequate quantities of clean air up to the dead ends of entries and rooms where the main current would never go unaided, bringing much-needed oxygen to hard-working men. After a blast, they clear the face, reduce waiting time and add productive minutes to every shift.

But improperly used, blowers and tubing — like most other mine equipment —may be inefficient and unsafe. Practical experience shows these *wrong* and *right* ways to use blowers and Du Pont "Ventube."

WRONG	RIGHT
 **DON'T** reduce air-flow by kinking "Ventube," bending it around sharp corners.	 **DO** get full flexibility and efficiency . . . turn sharp corners with proper "Ventube" fittings. And build good tubing patterns easily with T, Y and Reducer units.
DON'T lose air velocity by letting leaks and breaks go unfixed. Even "Ventube" is sometimes punctured or torn.	**DO** keep "Ventube" air-tight. It's *easy* with special "Ventube" Cement and Patching Cloth. Just follow directions. 
 **DON'T** risk reduction of air flow and unnecessary damage to "Ventube" by letting it lie on ground.	 **DO** suspend "Ventube" by its built-in hooks on taut messenger wire. Staple wire to timbers, or hang on pegs in drilled holes.

Du Pont "Ventube" is flexible tubing, sturdy fabric impregnated and coated with a special abrasion-resistant compound. It resists heat, moisture, mildew, dry-rot, acid and alkaline waters. It is easily carried and stored.

Properly suspended, free of sharp bends, and attached to a fan with adequate capacity and with permissible motor, "Ventube" flushes the face with fresh air . . . helps remove dust and bad air from any space a man can enter . . . speeds the production cycle . . . promotes health and steady efficiency of workers . . . is a vital part of the nation's war production effort. Use "Ventube" . . . and when you do, use it *right*. E. I. du Pont de Nemours & Co. (Inc.), "Fabrikoid" Division, Fairfield, Connecticut.

NOTE: War Production Board regulations permit us to supply "Ventube" for all mining purposes. To expedite delivery, it urged that you furnish us with complete priority information on your orders.

DU PONT "VENTUBE"

"VENTUBE" is Du Pont's registered trade mark for its flexible, rubberized ventilating duct.

DU PONT

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

sentation to the court. A reply to the answer of the defendants in the Northumberland County case, according to counsel for P. & R., raised questions on reimbursing the bootleggers for alleged improvements to property and for loss of wages caused by the injunction.

In the Lehigh Navigation case it was agreed that the plaintiff would not ask cash judgment, but that the defendants would be allowed to take out their tools and the injunction would be made final.

In the Raven Run case, Columbia county, a motion to dissolve the injunction was denied and the preliminary injuction was continued to final hearing. Three defendants were relieved from it, however, as two of them are working for Raven Run and the third is a trucker living outside the county.

•

Locks Earmarked For Explosives

U. S. Bureau of Mines has completed an arrangement in cooperation with the War Production Board and the War Department whereby suitable locks are now available and are earmarked for protection of explosives. Any company in need of locks for this purpose may obtain the number necessary to protect its stock in accordance with the regulations issued under the Federal Explosives Act by furnishing complete information to the Bureau of Mines inspectors who visit the property. Or such a letter may be addressed either to the nearest Bureau of Mines office or to the central office of the Bureau of Mines, Washington 25, D. C., attention Explosives Control Division.

Upon receipt of such a letter the Bureau will mail the applicant a certificate authorizing purchase of the number of locks justified by the facts presented. The applicant will then attach this certificate to his purchase order and mail both to the supplier. The supplier's name and complete mailing instructions appear on the certificate. Upon receipt of an order accompanied by a certificate, the supplier will forward the locks by return mail.

•

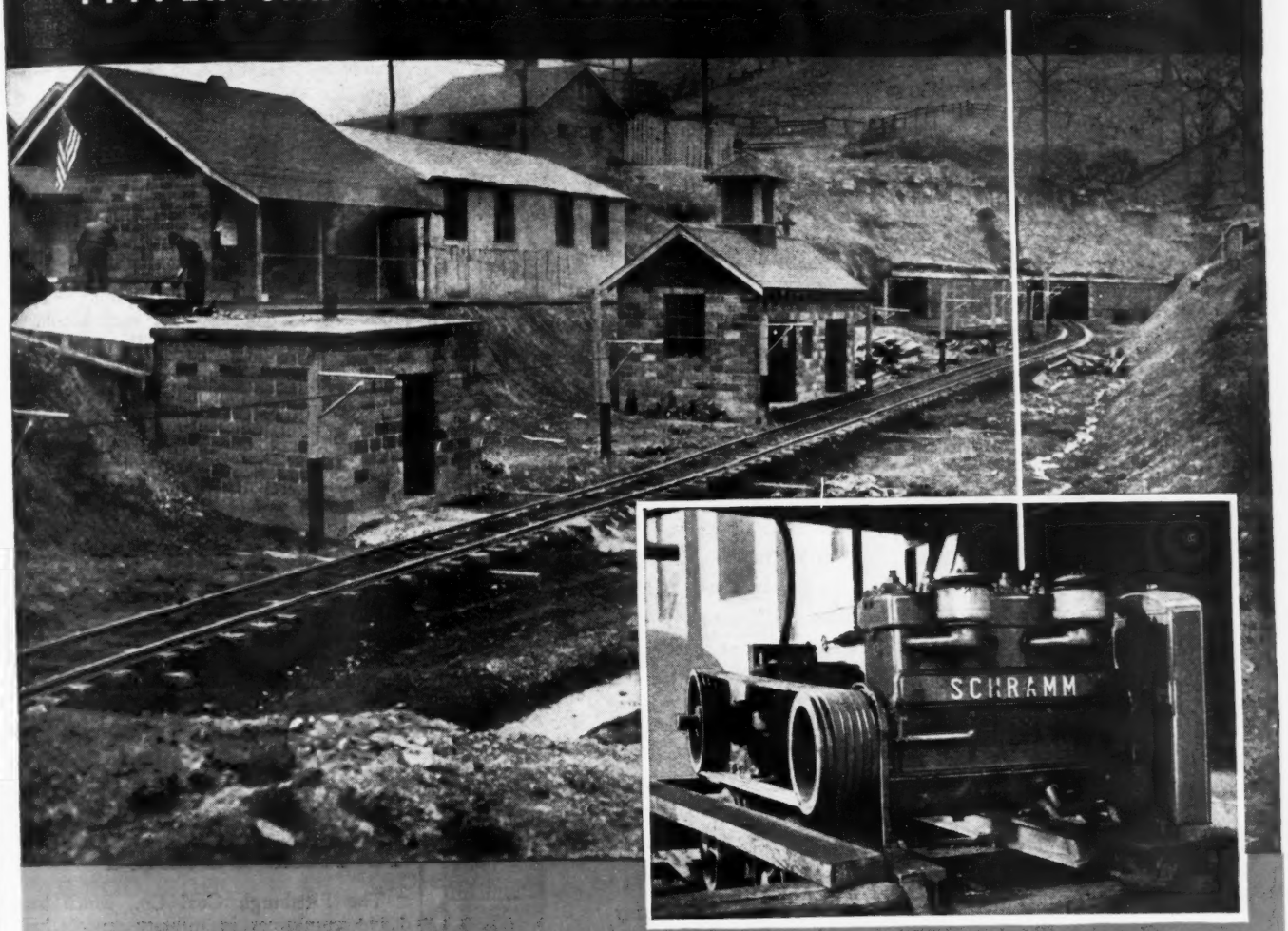
To Initiate Campaign To Cut Accidents

A campaign to prevent a million industrial accidents in 1944 will be inaugurated in April by the U. S. Department of Labor. Job injuries in the last year cost 56 million man-days of war production.

The Labor Department, through the State chairmen of its National Committee for the Conservation of Manpower in War Industries, will award certificates to two classes of establishments: (1) those having no lost-time accidents during a specified three-month period; (2) those that reduce the accident frequency rate by 40 percent in this three-month period as contrasted with the preceding three months.

These two classifications will permit both large and small plants to compete. Departmental services are available to industries entering the campaign. Over 600 special agents of the Manpower Conserva-

SANDBLAST YOUR MINE CARS IN 3 HOURS LESS TIME ...PER CAR...WITH SCHRAMM AIR COMPRESSORS!



"Where it once took 7 to 8 hours to sandblast each mining car, now it takes only 4 to 5 hours—because we have a Schramm Compressor!" reports a mine electrician and mechanic.

Over the course of two years this has resulted in a saving of many man hours, and quickened production. A 3-hour saving is recorded also in metalizing cars with air supplied by Schramm, the mechanic reports. The compressor doing this special job is a #210 Diesel stationary.

Schramm compressors are lightweight and compact—versatile to the point of cleaning machinery—rock drilling and boulder breaking—furnishing air for truck tires—blowing dust from electric motors and radiators. They're completely water cooled—self oiling because of forced feed lubrication—easy to start by pushing a button.

You will find Schramm an indispensable piece of coal mining equipment. For other information on how Schramm fits into your coal mining picture, write today for catalog 42-S or see the Coal Mining Catalogs.

Red Letter **SCHRAMM** *Features*

100% WATER COOLED... No freezing in winter, no overheating in summer.

BUILT AS A UNIT... Compressor and engine are coupled together as a perfectly aligned, vibrationless unit.

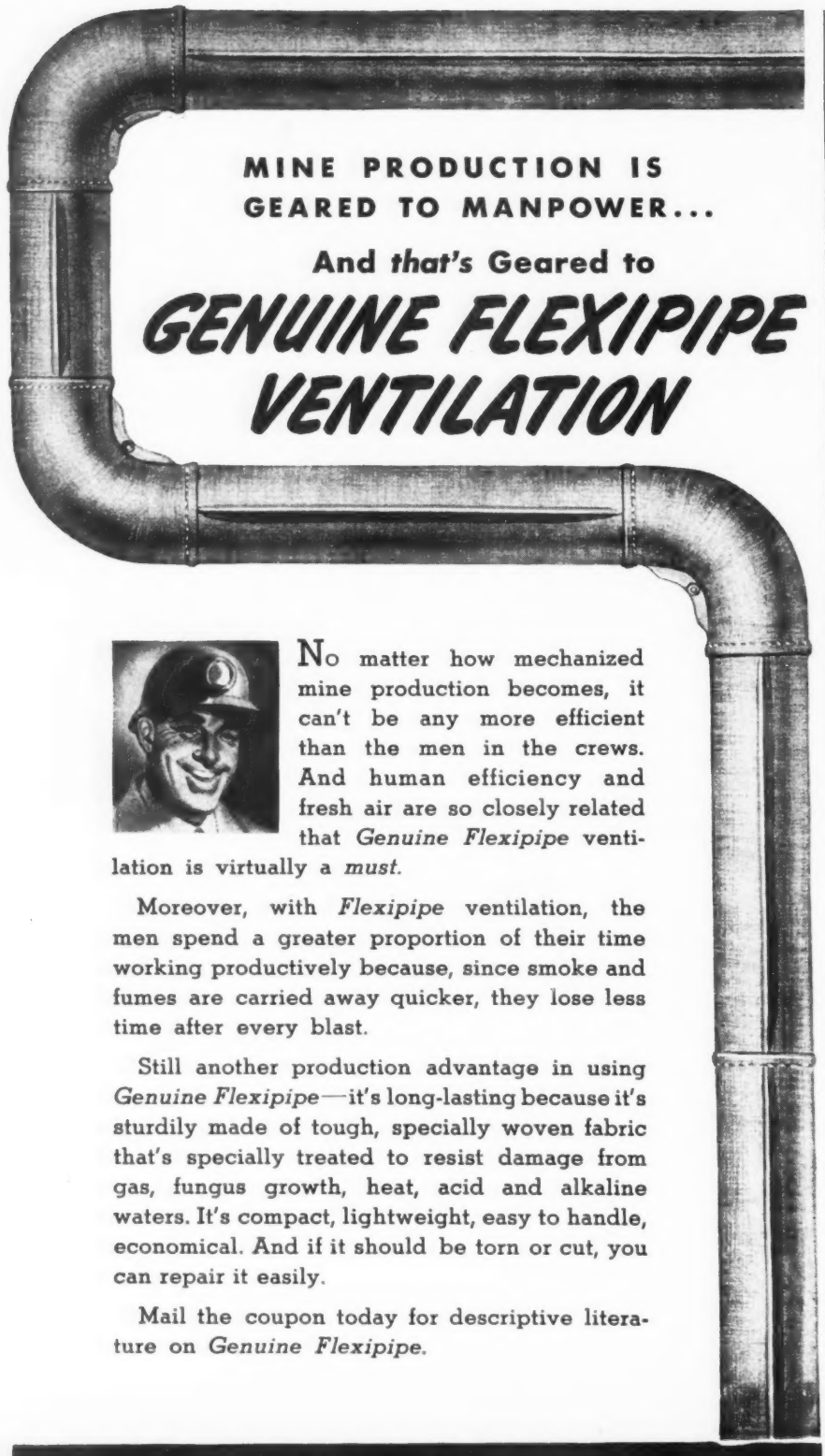
MECHANICAL INTAKE... Valves operate from cam in perfect timing with crankshaft and piston travel.

BUILT-IN ELECTRIC STARTING... No cranking, no injuries, and air in a minute. Just touching the button puts your men and tools to work at once.

LARGER DISCHARGE... Entire area of piston heads is devoted to one big discharge valve for each cylinder. Bigger area combined with lower lift adds to both efficiency and useful life.

★

SCHRAMM INC. THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA



MINE PRODUCTION IS GEARED TO MANPOWER...

And *that's* Geared to

GENUINE FLEXIPIPE VENTILATION

No matter how mechanized mine production becomes, it can't be any more efficient than the men in the crews. And human efficiency and fresh air are so closely related that *Genuine Flexipipe* ventilation is virtually a *must.*

Moreover, with *Flexipipe* ventilation, the men spend a greater proportion of their time working productively because, since smoke and fumes are carried away quicker, they lose less time after every blast.

Still another production advantage in using *Genuine Flexipipe*—it's long-lasting because it's sturdily made of tough, specially woven fabric that's specially treated to resist damage from gas, fungus growth, heat, acid and alkaline waters. It's compact, lightweight, easy to handle, economical. And if it should be torn or cut, you can repair it easily.

Mail the coupon today for descriptive literature on *Genuine Flexipipe.*

Specify GENUINE FLEXIPIPE

THE ORIGINAL FLEXIBLE VENTILATING TUBING

BEMIS BRO. BAG CO., 408-O Pine Street, St. Louis 2, Missouri

Please send literature on *Genuine Flexipipe.*

Name _____

Company _____

Street _____

City _____ *State* _____

tion Committee—themselves trained safety engineers now employed in large war plants—donate 20 percent of their time to consultation with smaller plants on accident reduction programs. War safety training classes are available—tuition free—for key supervisors, foremen and worker representatives. Further information on this safety campaign and the Labor Department's services can be obtained from the Division of Labor Standards, U. S. Department of Labor, Washington 25, D. C.

•

Labor Standards Act Raises Minimum Wage

An order establishing a minimum wage rate of 40c. an hour for each employee engaged in commerce or the production of goods for commerce in the metal ore, coal, petroleum and natural-gas extraction industries, effective March 20, has been entered by the Administrator of the Wage and Hour Division. The order is a result of recommendations of a committee appointed pursuant to provisions of the Fair Labor Standards Act. Previously the minimum wage rate under the act was 30c. an hour for hours up to 40 a week and time and a half the regular rate for work in excess of 40 hours during the work week. While raising the minimum for the first 40 hours, the requirement to pay time and a half the regular rate (not the 40c. minimum rate) for time worked in excess of the 40-hour work week remains in force.

•

Pittsburgh Coal Co To Train Disabled

The Pittsburgh Coal Co., which has 1,444 employees in military service, has begun a study directed toward a program of job placement for handicapped and disabled war veterans on their return to civilian life, it was announced March 22. A committee of mine superintendents and operating officials have held three meetings in recent weeks to develop a plan of procedure which will be put into practice at the company's 22 plants in Allegheny, Washington, Westmoreland and Fayette counties, Pennsylvania.

Already, through the committee's work, 13 former employees who were given medical discharges from military service have been trained and placed in new jobs suitable to their physical fitness. One who had worked as a transitman with the engineer corps was reemployed and trained to do a clerical job in the purchasing department.

Dr. D. C. Braun, medical examiner for the company, has asked the committee to establish a plan for rehiring disabled veterans in accordance with their ability, skill and physical fitness. Dr. Braun pointed out that because coal mining is a heavy industry, requiring generally a high degree of physical fitness of its personnel, the job-placement plan must be developed in great detail if it is to be successful in finding the right job for which a disabled veteran can be trained.

SPEEDS UP WORK

SAVES MATERIAL

THE Coal Mining Industry can well be proud of its war-time production record. Its high-operating efficiency—developed during peacetime—has had much to do to bring the war to its "final phase."

In keeping with well-established principles, the coal mining industry of this country has long been quality-conscious about production tools. Their demand for greater efficiency through quality equipment is reflected in the wide-spread acceptance of "HERCULES" (Red-Strand) Wire Rope in the mining field.

Confidence in "HERCULES" (Red-Strand) Wire Rope is well founded, as it is a product of long experience—designed and manufactured to do specific jobs better . . . safer . . . more economically. It is available in both Round Strand and Flattened Strand constructions as well as in Preformed and Non-Preformed types. There is in this one grade—a right rope for every heavy duty purpose.

MADE ONLY BY

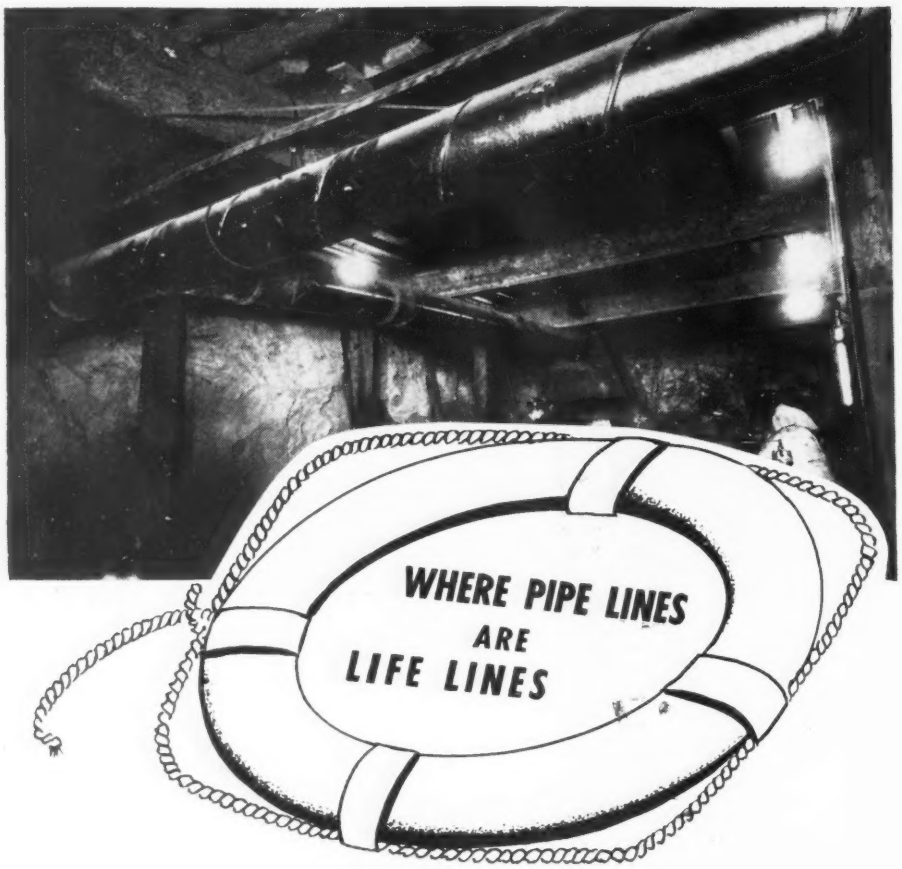
A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK . . . . . 90 West Street
CHICAGO . . . 810 W. Washington Blvd.
DENVER . . . . . 1554 Wazee Street

SAN FRANCISCO . . . 520 Fourth Street
PORTLAND . . . 914 N. W. 14th Avenue
SEATTLE . . . . 3410 First Avenue South



Specify NAYLOR *Light-weight* PIPE *for Dependable Mine Ventilating Service*

Here's why it will pay you to use light-weight Naylor Pipe for push-pull ventilating service.

Naylor's exclusive Lockseam Spiralweld structure provides pipe that is always accurate in diameter . . that is round and holds its true cylindrical form during transportation, installation and service. Ends always match correctly so that the line is tight and leak-proof—puts the air where you need it positively, economically.

The Lockseam Spiralweld creates a reinforcing truss which assures extra collapse strength and permits the use of Naylor Pipe on jobs that no other lightweight pipe can handle. The larger the diameter pipe required, the more this is true.

Economy is another factor. Mine operators report that Naylor is the one pipe that can be used and re-used in ventilating service, thanks to the reinforced struciure.

Important advancements in manufacture and assembly make Naylor Pipe even more effective in ventilating service today than ever before. Find out how you can benefit by Naylor performance on your next ventilating installation.

Specify Naylor Pipe for De-Watering Ventilating • Exhaust and Intake Vacuum Lines and other high or low pressure air and water lines.

Sizes from 4 to 30 inches in diameter . . . all types of fittings, connections and fabrication.

Naylor **NAYLOR PIPE COMPANY**

1268 East 92nd St. • Chicago 19, Illinois

Stripping Under Way In Wyoming Tract

Strip operations on a large tract 12 miles north of Sheridan and 5 miles west of Monarch, Wyo., is getting under way by the recently organized Big Horn Coal Co., Sheridan. Proved coal deposits show that more than 1,000,000 tons can be mined. At peak operation, about 2,000 tons daily is to be produced, employing at least 50 men, according to officers of the company.

A modern tipple and screening plant are nearing completion on the main line of the Burlington R.R., with which oil-treated stoker coal is to be produced. Truck shipping facilities are to be provided soon. The contract for stripping operations has been let to the Peter Kiewit Construction Co., Sheridan.

Officers of the Big Horn Coal Co. are: Alger W. Lonabaugh, president; Harry Schwartz, vice president; Glenn W. Hardy, secretary-treasurer, and George Nugent, superintendent in charge of operations, assisted by James Fogg. Mr. Schwartz is to be inducted into the army soon and will be replaced by Robert Warinner, of Seattle, who recently became sales manager of the company.

•

Big Sandy Engineers Hear Baker

One hundred and fifteen operators and key mining men attended the meeting of the Big Sandy-Elkhorn Coal Mining Institute, March 24, at Pikeville, Ky., when Donald J. Baker, assistant sales manager, I. T. E. Circuit Breaker Co., spoke on "What Does D.C. Power Sectionalizing Promise for Kentucky Mines?" There was an address also by R. H. Benney, president, R. H. Benney Equipment Co.

•

Synthetic Oil Bill Passes Congress

Legislation authorizing the construction and operation of demonstration plants to produce synthetic liquid fuels from coal, oil shale and other substances passed both houses of Congress March 28 and was sent to the President. The measure provides for expenditure of a maximum of $30,000,000 to solve the country's problem of a future oil supply by developing alternate techniques, if and when our reserves of crude oil shall have been depleted.

Heading the House conferees, Representative Jennings Randolph explained that in its final form the bill provides that any inventions, discoveries or processes that may result from the enterprise would be made available to all citizens or corporations of the United States. In like manner, all inventions, discoveries or processes for which patents are acquired in their entirety by the Secretary of the interior under the act would be made available to the public.

TAMP . . . TAMP . . . TAMP

The Boys are Blasting WITH

SEAL-TITE Tamping Bags

...to Beat THE 1944 WAR PRODUCTION QUOTA

They provide full proper tamping for safe, efficient shooting of shot holes simple and inexpensively. They reduce the number of charges by increasing the effectiveness of every charge —less explosive is needed and danger of shattering heavy blasts which endanger working structures is eliminated. They are carefully manufactured to assure dependable, economical service. They conform with rigid high standards of quality and safety. Supplied in any width—any desired length or weight of paper. Find out why so many mine operators prefer SEAL-TITE Safety Seam Tamping Bags —Write for particulars.

THE TAMPING BAG COMPANY

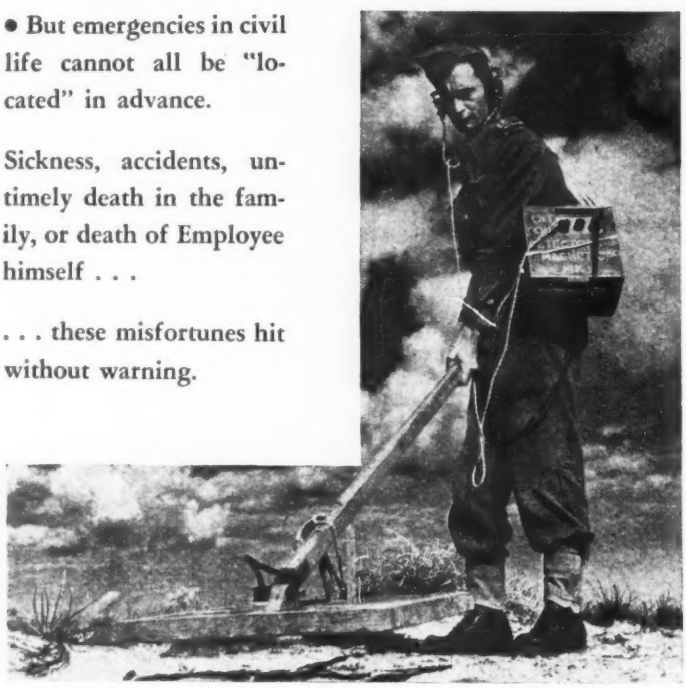
MOUNT VERNON, ILLINOIS

Science Helps Our Fighters Spot Hidden Enemy Mines

• But emergencies in civil life cannot all be "located" in advance.

Sickness, accidents, untimely death in the family, or death of Employee himself . . .

. . . these misfortunes hit without warning.



That's why leading Coal Mine Employers for decades have made it possible for Employees to enjoy the scientific protection of a Provident HUMAN SECURITY Plan which helps Employees meet the extra expenses caused by

- *Death in family*
- *Loss of time due to Sickness and Accident*
- *Dismemberment*
- *Aiding dependents upon death of employee*

PROVIDENT LIFE AND ACCIDENT INSURANCE COMPANY

Since 1887

CHATTANOOGA, TENNESSEE

Now protecting more than *ONE MILLION* Workers and Their Dependents

School to Teach Mine Maintenance

A course in repair and maintenance of coal-mining equipment is to be added to the instruction program of the Mercer County (W. Va.) vocational schools, it was decided March 13 at a meeting in Bluefield of coal operators of Mercer and McDowell counties and officials of the Federal and State departments of education. The course, taking about three years, will begin in the tenth grade of high school. An electrical class forming part of the new course is being planned to begin immediately, according to W. R. Wood, director, Mercer County vocational schools.

Mr. Wood planned to accompany G. J. Hardy, U. S. Office of Education, Washington, D. C.; William B. Connoley, State Department of Education, vocational division, and E. B. Heiny, assistant supervisor, vocational training, war production workers program, to a conference with McDowell County school officials on setting up a similar program there.

In attendance at the Mercer County meeting, in addition to the educational officials, were: W. E. E. Koepler, Pocahontas Operators' Association; B. C. Hylton, Lake Superior Coal Co.; G. F. Mash, Weyanoke Coal & Coke Co.; Roland C. Luther, Peerless Coal & Coke Co., and G. Pile, Pond Creek Pocahontas Co.

•

Mine Waste Law To Be Suspended

Armed with legal authority to remove the exemption hitherto given coal-mine solids by the anti-stream pollution law, the State Sanitary Water Board of Pennsylvania set in motion March 17 a program aimed at cleaning up streams of the State of sewage and industrial waste. Dr. A. H. Stewart, Secretary of Health and chairman of the board, said clean-up orders would be issued to municipalities and industries now polluting streams after the board shall have held public hearings so they will know what is required of them in the way of treatment works.

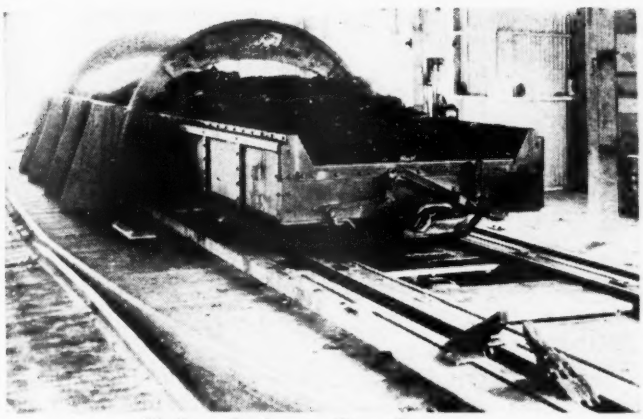
Dr. Stewart said the board also plans to use its authority to declare a limited suspension of the law's mine-waste exemption "to accelerate the improvements now being effected in cooperation with the mining industry and to bring about a marked reduction in the silt discharges into streams in the coal fields."

Meanwhile, Federal Judge Guy K. Bard dismissed at Philadelphia a suit by John B. Kelly, former chairman of that city's Democratic committee, to restrain 13 anthracite companies from dumping silt into the Schuylkill River. The court held that Kelly's complaint named the companies jointly when it should have named them individually. He added that his action does not prevent Kelly, who charged that silt deposits interfered with his river-bank brick yard, from bringing separate suits.

In an opinion asked by the Sanitary Board, Attorney General James H. Duff ruled the agency has authority to order

NOLAN

EFFICIENT MINE OPERATING AND SAFETY DEVICES



Nolan Rotary Car Dumper

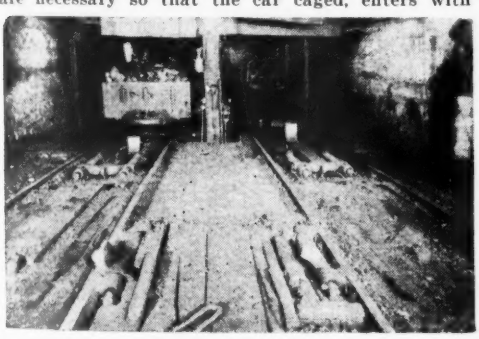
Nolan power-operated Rotary Car Dumpers are designed to meet all modern requirements as to car size or dumping speed. Trips may be dumped coupled or uncoupled, one or two at a time, or entrain.

Patented features of Nolan Rotary Car Dumpers assure wide factors in safety, speed and economy of operation, with rugged materials and construction assuring long life at low maintenance costs.

One of the many special features of Nolan Rotary Car Dumpers is the use of Automatic Contactors and Time Relays so that only one limit switch is required on the Dumping Rings. Nolan Rotary Car Dumpers answer every demand for solid body, large capacity mine car service.

Nolan Bumper Stop Cager and Dump Feeder

The Nolan Patented Automatic Bumper Stop Cager was developed to automatically and rapidly handle mine cars to hoisting cages without damage to car wheels, journals and axles. Cars are stopped by engagement with the car bumpers which are designed for just this type of service. For rapid gravity caging, heavy grades are necessary so that the car caged, enters with sufficient force to push the empty from the cage and to assume its position for hoisting with a minimum time lag. To cushion the shock of this rapid handling, use Nolan Bumper Stop Cages. They have proved their ability in the heaviest service.

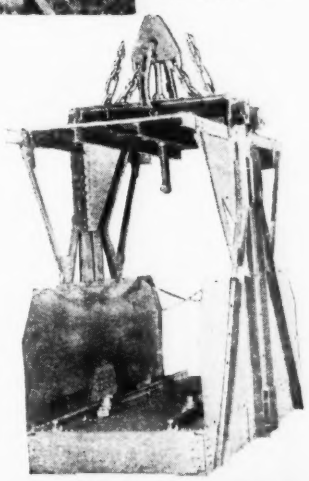


Nolan Self-Dumping and Platform Cages

Nolan Self-Dumping and Platform Cages are designed and constructed to fulfill satisfactorily the demands of each individual caging and hoisting job.

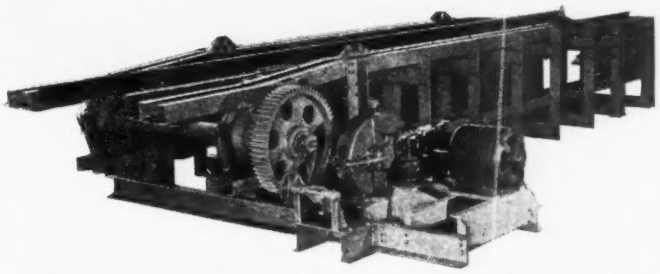
The Nolan Cage does not depend upon latches to lock the cage platform—it cannot tip until cage reaches dumping point.

All types equipped with automatic cam type safety dogs which function instantly in case of rope failure.



Nolan Trip Feeder

Modern mine car design, with wide bodies and low clearance over top of rail make engagement with lug on bottom of car impractical. The Double Chain Trip Feeder is designed to engage the car at the ends, between bumpers or on lugs under body.

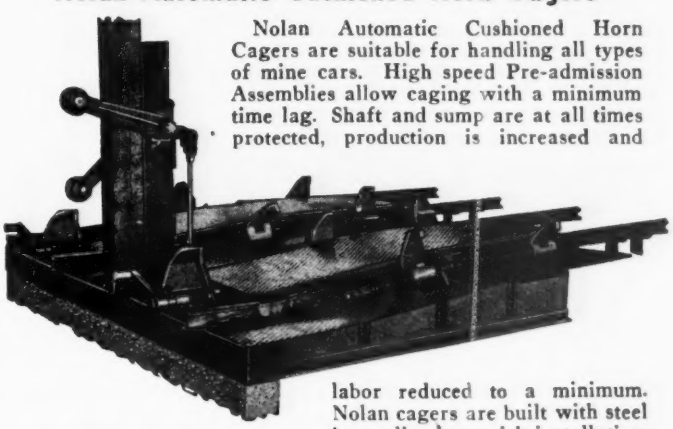


These Feeders are built with extremely heavy frame, shafts, sprockets and gearing and with specially constructed heat treated chains and dogs.

The drive includes accelerating and decelerating features for high speeds and is reversible where required.

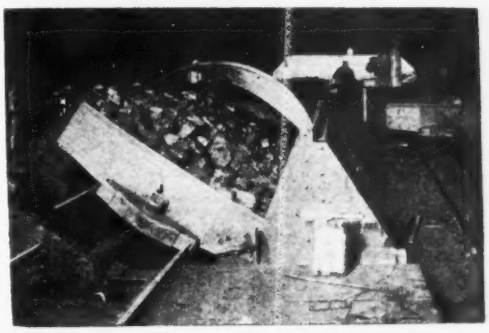
Nolan Automatic Cushioned Horn Cagers

Nolan Automatic Cushioned Horn Cagers are suitable for handling all types of mine cars. High speed Pre-admission Assemblies allow caging with a minimum time lag. Shaft and sump are at all times protected, production is increased and labor reduced to a minimum. Nolan cagers are built with steel base allowing quick installation, and with cover plates protecting all moving parts. Cushioned Horn Type Cagers are built in single and double horn models cushioned with very large compression springs.



Nolan Side-Tip Gravity Dump

The Nolan Side-Tip Gravity Dump is designed for dumping all types of mine cars uncoupled. Dump is arranged for full automatic, semi-automatic or hand brake operation. The Nolan Automatic Dump is controlled by a double acting hydraulic cylinder which allows the dump to turn nearly 180 degrees and assures clean dumping. Five to seven cars a minute may readily be dumped.

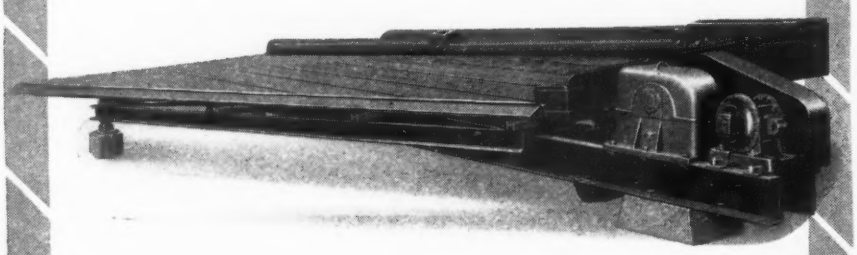


Write for Complete Information

THE MINING SAFETY DEVICE CO.

★ ***BOWERSTON, OHIO*** ★

SuperDuty Assures More Coal Production and Profits!



Marketable coal production and operating profits are being greatly increased by many coal operators who are modernizing their coal washing operations with SuperDuty Diagonal Deck Coal Washing Tables. Backed by 37 years of engineering "know-how", SuperDuty Tables assure maximum recoveries, save many hours of critical time and labor and increase daily output of marketable coal.

Don't permit old-fashioned coal washing methods to steal your profits or retard your marketable coal production . . . modernize with SuperDuty. Write for descriptive bulletin No. 119A and see for yourself why SuperDuty Tables are first choice with shrewd operators—large and small alike.

THE DEISTER ★
CONCENTRATOR
COMPANY
909 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
COMCENCO PRODUCTS

★ *The ORIGINAL Deister Company • Inc. 1906*

the removal of solids from waste water "to the extent that reasonable and practicable methods are available," adding "to hold otherwise would be to say that because all mine pollution could not be successfully removed at one fell stroke it should all be tolerated until that becomes possible."

Denying exceptions to the City of Philadelphia's bill of complaint, Common Pleas Judge Joseph L. Kun, in an opinion March 22, swept aside legal obstacles to the city's suit asking an injunction to restrain 24 anthracite companies from discharging silt and other waste matter into the Schuylkill. "Nothing is more fundamental than the right of the people to have the public streams from which they draw their water supply free from pollution," said Judge Kun.

•

Walkout Closes Republic Co. Mine

Sayreton No. 1 mine of the Republic Steel Corp., Sayreton, Ala., was shut down March 13 after a walkout of 85 firebosses and face foremen. Joe Morris, assistant director, District 50, United Mine Workers, said the firebosses and foremen voted to walk out under the Smith-Connally act. "The company refuses to bargain collectively with these men," he said.

•

Four Union Officers Jailed for Strike

Four United Mine Workers officials at Truesdale colliery of the Glen Alden Coal Co., Nanticoke, Pa., were arrested March 10 on federal bench warrants charging them with having violated provisions of the War Labor Disputes Act. The accused —Dennis Brislin, president of the union local; Russell Leck, recording secretary; Leo Kussavage and Victor Martusa, grievance committee members—are charged specifically with having been instrumental in calling a strike at the Truesdaye colliery that tied up that operation Dec. 8 and 9 of last year against the advice of district union officers.

The men went to jail for a night before being able to post $1,000 bonds each. About 50 witnesses were summoned to testify at the trial of the men. Pleas of innocent were entered by the accused.

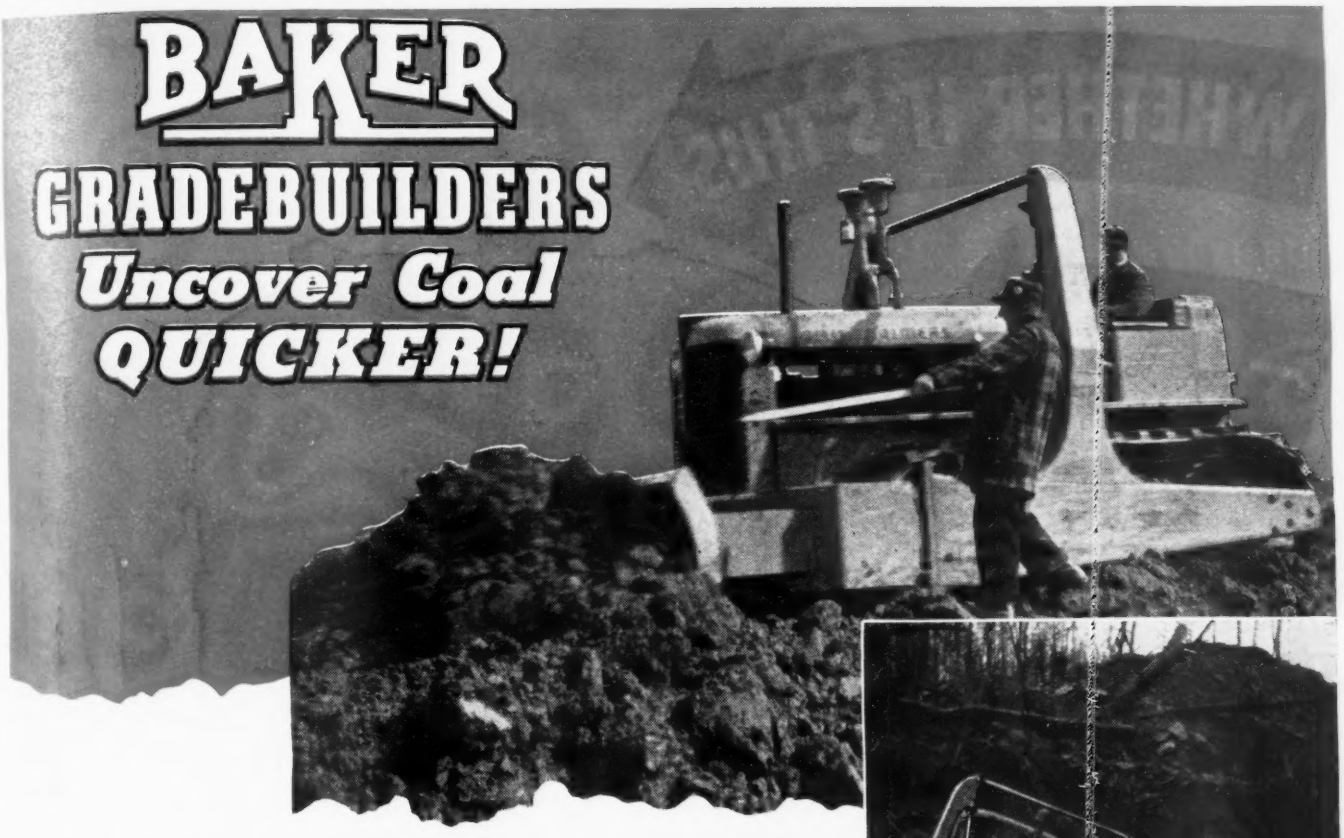
At ttheir trial, March 22, the men pleaded guilty and were fined $250 each, which was paid promptly, and placed on probation for six months by Federal Judge Albert W. Johnson.

•

Scranton Goes Afield For Mine Workers

Preparations for an intensive and vigorous out-of-area recruiting drive to obtain manpower to operate anthracite mines at peak production during the summer and next winter got under way March 21 in the Scranton (Pa.) area, War Manpower Commission. Making a reversal of the

BAKER GRADEBUILDERS Uncover Coal QUICKER!



The Baker Gradebuilder pictured is stripping overburden for the Leckie Smokeless Coal Company at Anjean, West Virginia. Some of the slopes at this mine are plenty steep, but the Gradebuilder does a rapid and efficient stripping job because its blade can be angled to left or right and also tilted horizontally, making it adaptable to any terrain. Outcrops formerly considered too hard to work have been profitably opened with this readily maneuvered unit.

Part of the operating area is tree-covered, as pictured below. In place of the time-consuming method of chopping down trees, used at some strip mines, the powerful Gradebuilder quickly pushes the trees over and roots them out—then strips the overburden.

In addition to uncovering the coal, the Gradebuilder is used for helping the shovels load coal and for building access roads and ramps into the pits. For extensive leveling operations, its moldboard can be readily replaced with a bulldozer moldboard. Both fit on the same frame.

Baker Gradebuilders minimize the cost of stripping overburden, and get a lot of other jobs done more economically. Scores of mining operations in both the bituminous and anthracite fields use Bakers.

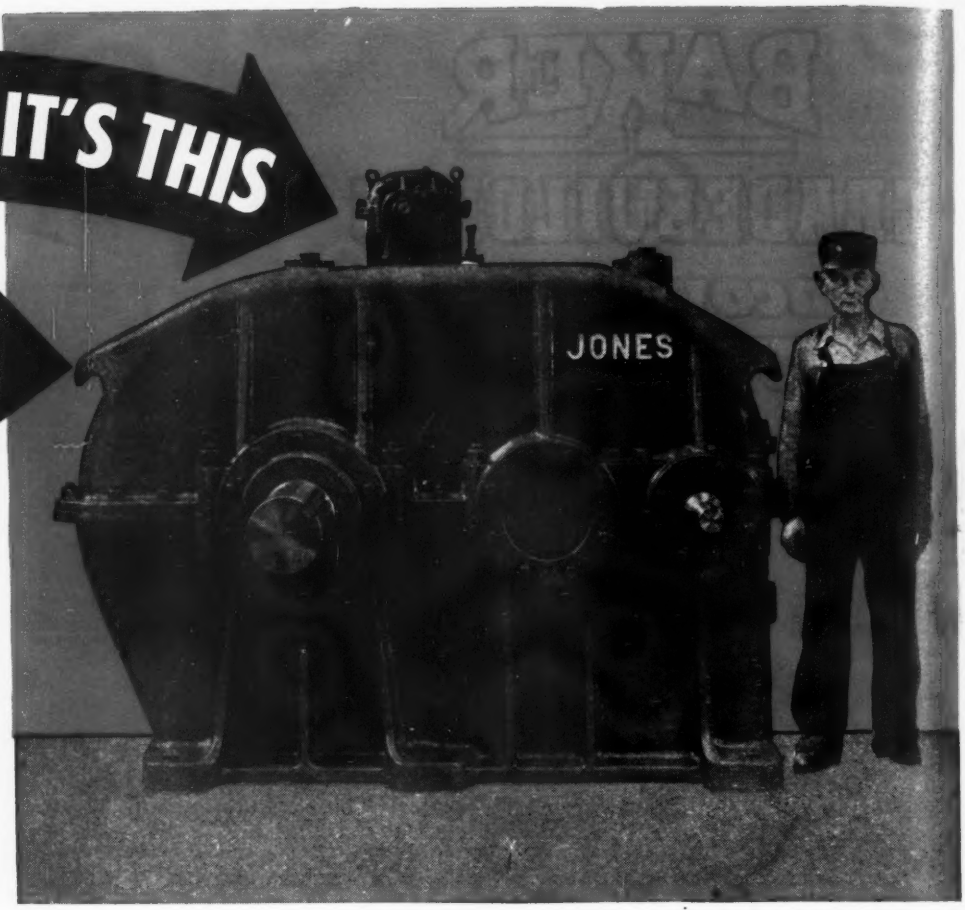
THE BAKER MFG. CO.

"If it concerns Victory, it concerns us."

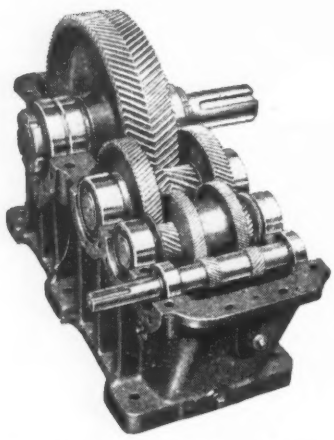
514 Stanford Ave. **Springfield, Ill.**

BULLDOZERS SNOW PLOWS **BAKER** CONSTRUCTION EQUIPMENT

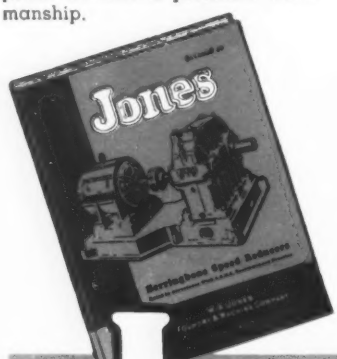
WHETHER IT'S THIS —OR THIS



. . . both will stand up under war time conditions



The above view of a Jones Triple Reduction Herringbone Speed Reducer is typical of a line that is noted for advanced design, superior materials, precision workmanship.



TWENTY FOUR hours a day operation plus loading up to rated capacity or beyond are testing speed reducers in every type of service.

Jones Herringbone Speed Reducers are establishing remarkable service records under these conditions. One reason of course is the fact that Jones Reducers have always been rated in accordance with the recommended practice of the American Gear Manufacturers Association.

With this conservative rating policy goes sturdiness, compactness, symmetry and balance—all factors that influence maximum efficiency, long life and improved performance.

Jones Herringbone Gear Speed Reducers are built in a wide range of ratios and ratings to cover every requirement. Single (Type SH) reducers in standard ratios range from 1.25 to 1 up to 11 to 1 in ratings from 1.3 to 440 H.P. Double (Type DH) reducers are built in standard ratios from 10.9 to 1 up to 72 to 1 in ratings from 0.5 to 275 H.P. The triple reduction reducers (Type TH) cover a range of ratios from 86.9 to 1 up to 355.8 to 1 in ratings from 0.3 to 78 H.P.

All these reducers have heat treated gears, ground shafts and are mounted with anti-friction bearings throughout. Cast iron bases are available for all variations of motor assembly.

For complete information on both standard and special applications of Jones Herringbone Reducers ask for Catalog No. 70. This 128 page catalog is a comprehensive technical treatise on the whole subject of Herringbone Reducer application for all conditions of service. If you have any type of drive problem that might call for Herringbone gears we shall be pleased to send you a copy.

W. A. JONES FOUNDRY & MACHINE CO., 4401 Roosevelt Road, Chicago, Ill.

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

practice prevailing since the area became a labor market for war plants in the East, it was announced that personnel representatives of mining companies and WMC interviewers were to be sent to Bethlehem and other war-industry towns to bring back as many as possible of the 6,000 to 7,000 former mine workers now holding other industrial jobs. All U. S. Employment Service offices in Pennsylvania, New Jersey and Delaware will participate in the campaign.

•

Personal Notes

C. Arthur Carlson, Utah State coal mine inspector, has been appointed superintendent of the Spring Canyon Coal Co., Spring Canyon, Utah. Prior to becoming State mine inspector, in April, 1943, he was assistant superintendent and mine foreman at Spring Canyon mine. Walter Cochrane, resigned, whom he succeeds, was associated with Spring Canyon, Standard and Royal (merged several years ago) since December, 1937, when he succeeded the late David Brown as superintendent.

Fritz Nyman has been named acting general superintendent of the Utah Fuel Co., Carbon County, Utah, vice W. D. Bryson, former manager of mines, resigned. Mr. Nyman, who started with the company in 1927 as a mechanic and mine engineer, has been chief engineer for the last ten years.

Howard Oster, formerly inspector, U. S. Bureau of Mines, has been named general superintendent, Puritan Coal Corp., Puritan Mines, W. Va.

Frank C. Carothers has accepted a position as general superintendent with the Russell Fork Coal Co., which will open a new mine on Beaver Creek near Elkhorn City, Ky. He will continue as vice president of the Puritan Coal Co. but will change his residence from Puritan Mines, W. Va., to Pikeville, Ky.

Francis Edmond, director and general manager, Wigan Coal Corp., Ltd., has been reelected president of the Institution of Mining Engineers, London.

R. D. Thompson has been appointed outside superintendent and G. A. Llewellyn as purchasing agent of Rachel mine, Jones Collieries, Inc., Rachel, W.Va.

Clyde Williams, director, Battelle Memorial Institute, Columbus, Ohio, has been engaged by the Association of American Railroads as technical consultant. He will make a study of the railroads' technical problems with a view to coordinating and organizing research relating to technological methods and processes. His office will be at 59 East Van Buren St., Chicago. He also is chairman of the War Metallurgy Committee which is advising WPA and various other war agencies.

John Kozek has been promoted to superintendent of the Nokomis Coal Co., Nokomis, Ill.

James D. Francis, president, Island Creek Coal Co., Huntington, W. Va., has accepted appointment to a joint advisory committee of the U. S. Chamber of Commerce to industry members of the National War Labor Board.

Announcing
THE IMPROVED-TYPE
SINTA-SET
TRADEMARK
DIAMOND CORE BIT

FOR LOWER BIT COST ON EVERY FOOT DRILLED

Here's Why

Here is the new, improved-type Sinta-Set Core Bit that's making outstanding records in economy on all types of exploratory drilling! Many leading mines report far lower bit cost per foot drilled than ever previously obtained, and increased bit life three to four times greater than ordinary bits.

Sinta-Set Core Bits contain special tungsten carbide matrix with whole diamonds of West African high quality Bortz throughout entire matrix—not just on outer surface. High quality diamonds—and more of them; actually 4 times greater diamond content! That means extra-long life, extra-low bit cost per foot drilled.

Get this new order of economy in bit cost for exploratory drilling. Prompt deliveries sizes EX, AX, BX, NX. Casing bits also available. Write for catalog and prices.

☆ 3 Times Longer Life!
☆ 90% Diamond Utilization!
☆ Maintains Closer Tolerances on Inside and Outside Gage!
☆ Only 2 to 5 Minutes to Recondition!
☆ No Re-setting!
☆ Diamonds Throughout Entire Matrix!
☆ Uniform Rate of Wear Across Kerf!

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DIAMOND CORE BIT

MINE OPERATORS:

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REDUCE SCREENING LOSSES

...CHANGE OVER TO "BEE • ZEE" ROUND • ROD SCREENS

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★

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BIXBY-ZIMMER round rod screens are helping stop coal waste at scores of mines throughout the country. These hardened alloy long-life screens are designed to maintain greater screening efficiency for a longer operating period, due to round-rod construction and high quality fabrication.

"Bee-Zee" Screens have served 3 to 4 years under steady use with screen openings still accurately maintained. They're tailor-made in many designs for all sizing, dewatering and drying equipment.

Now's the time to install these money-saving screens in your plant.

Write us today for complete information. We'll be glad to serve you.

BEE ZEE

ALL TYPES OF SCREENS ARE AVAILABLE: Chute & Conveyor Screens, Rigid Panel Vibrator Screens, Heat Dryer Screens, Hook-type Vibrator Screens, Shaker Panel Screens, Centrifugal Dryer Screens and Sizing Screens.

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LOOK AT THE GROOVES

...for the key to V-Belt Drive Efficiency

Only sheave grooves that are precision machined, accurately spaced and absolutely true, with side walls at perfectly uniform angles can make possible a really efficient V-Belt Drive. Wood's Sheaves are just that kind—engineered to provide for a snug fit and firm grip by the V-Belts.

The full molded belts on a Wood's drive are flexible and resilient... matching the grooves perfectly. The harder the pull the greater their wedging action and the higher their percentage of efficiency ... 98% is not uncommon.

There are large assortments of sheave sizes and standard V-Belts always on hand in Wood's warehouses. In most cases, requirements can be made up from stock drives for immediate shipments. Also special sheaves with extra weight for flywheel effect, bolting flanges and other special features to permit sheaves to form integral parts of customers' machines can be made from array of flexible patterns right here in Chambersburg. No extra expense to customer for pattern equipment. Our 64-Page V-Belt catalog describes fully the Wood's V-Belt Drive. Send for a copy.

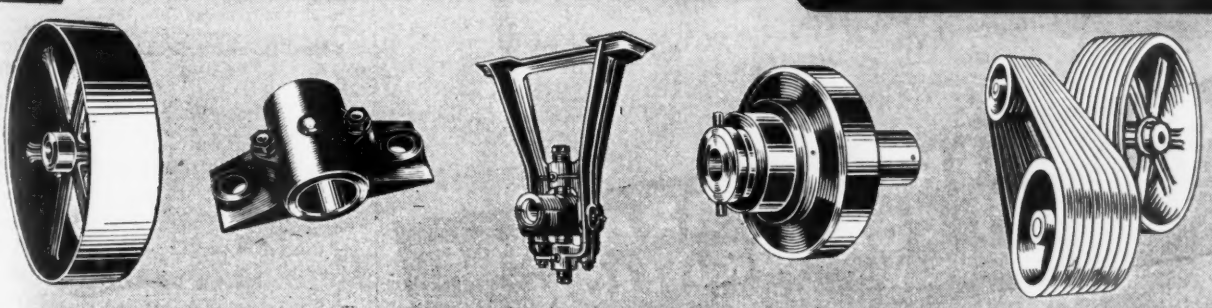
Wood's V-BELT DRIVES

the LONG LIFE LINE

EVERYTHING IN TRANSMISSION

Bearings — Collars — Clutches — Couplings — Contactors — Hangers — Pillow Blocks — Pulleys — V-Belt Sheaves and Complete Drives

MEMBER MULTIPLE V-BELT DRIVE ASS'N



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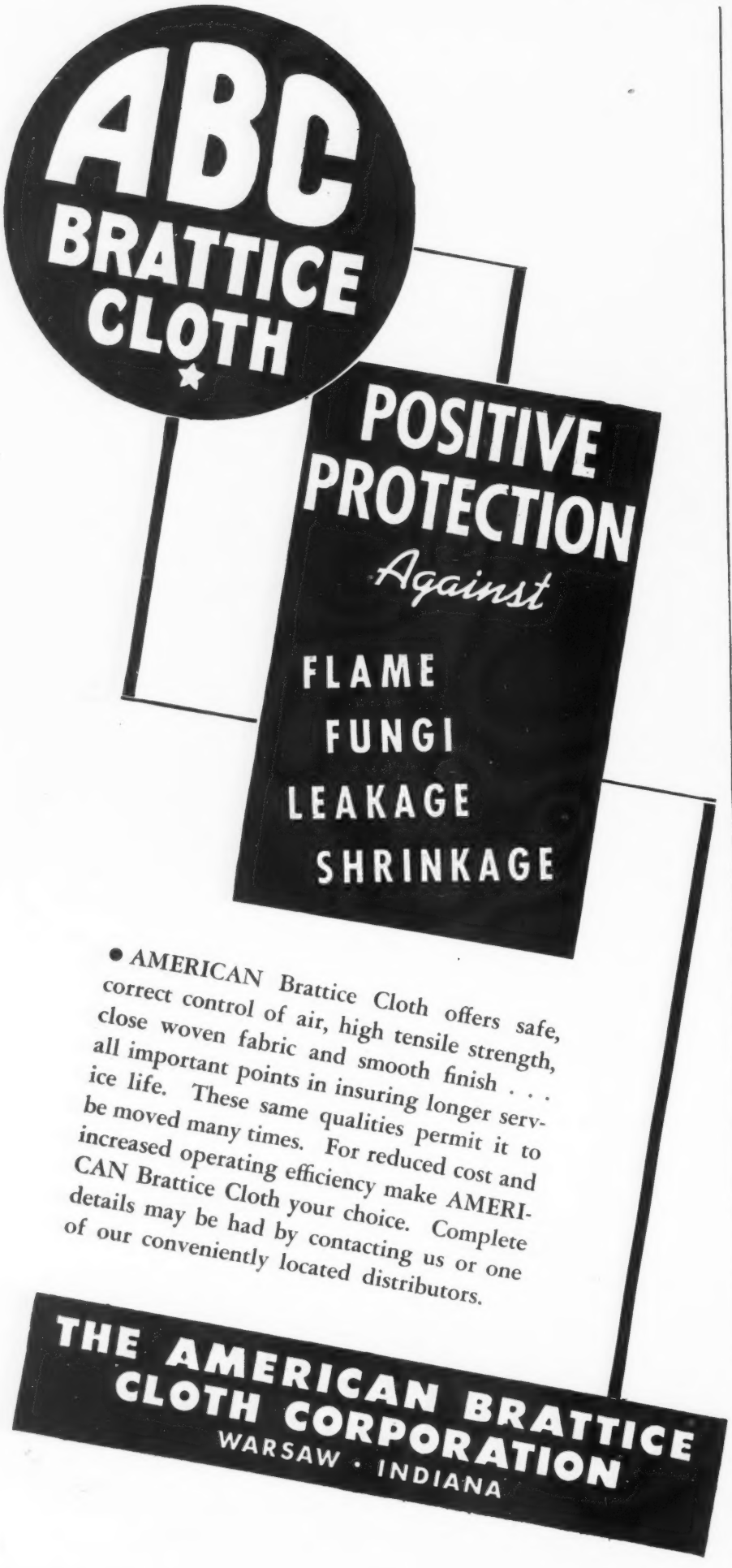
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• AMERICAN Brattice Cloth offers safe, correct control of air, high tensile strength, close woven fabric and smooth finish . . . all important points in insuring longer service life. These same qualities permit it to be moved many times. For reduced cost and increased operating efficiency make AMERICAN Brattice Cloth your choice. Complete details may be had by contacting us or one of our conveniently located distributors.
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WARSAW • INDIANA

Activity Renewed On St. Lawrence Project

Activity on the St. Lawrence waterway and power project has been renewed with the introduction of resolutions in the New York Legislature at Albany memorializing Congress and the President to enact the bill introduced by Senator Aiken of Vermont. As an alternative to prompt federal action, the resolution undertakes to pledge the State of New York, in collaboration with the Province of Ontario, to proceed with the power development without reference to possible action in Washington.

President Roosevelt recently requested Senator Aiken to join in a "non-partisan effort" to authorize the St. Lawrence project in connection with the post-war construction program.

The Senate commerce subcommittee, under the chairmanship of Senator Overton of Louisiana, has requested reports on the Aiken bill from the State and War departments, the Federal Power Commission and the Bureau of the Budget, and no hearings will be held until these reports are received.

In Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons Feb. 1 1944	P.c. Change From Jan. 1 1944	P.c. Change From Feb. 1 1943
Electric power utilities	13,871	−5.9	−28.0
Byproduct coke ovens	6,172	−2.3	−38.1
Steel and rolling mills	752	+7.1	−30.7
Railroads (Class I)	9,231	−2.8	−20.2
Other industrials*	18,230	−9.2	−37.5
Total	48,246	−6.0	−32.1

Bituminous Coal Consumption

	Thousands Net Tons Jan. 1944	P.c. Change From Dec. 1943	P.c. Change From Jan. 1943
Electric power utilities	7,257	−3.1	+21.3
Byproduct coke ovens	8,022	+2.0	+4.4
Steel and rolling mills	1,020	+1.8	−2.8
Railroads (Class I)	12,043	+1.1	+5.2
Other industrials*	14,269	−8.0	−6.6
Totals	42,611	−2.9	+2.8

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

February, 1944, net tons	52,740,000
P.c. change from February, 1943	+7.3
January-February, 1944, net tons	106,540,000
P.c. change from Jan.-Feb., 1943	+11.0

Anthracite Production

February, 1944, net tons	5,869,000
P.c. change from February, 1943	+13.4
January-February, 1944 net tons	10,897,000
P.c. change from Jan.Feb., 1943	+13.3

Sales, Domestic Stokers Vs. Oil Burners

	Stokers	Burners
January, 1944	1,437	1,922
P.c. change from Dec., 1943	−16.1	−29.5
P.c. change from Jan., 1943	−20.5	−30.6

Index of Business Activity*

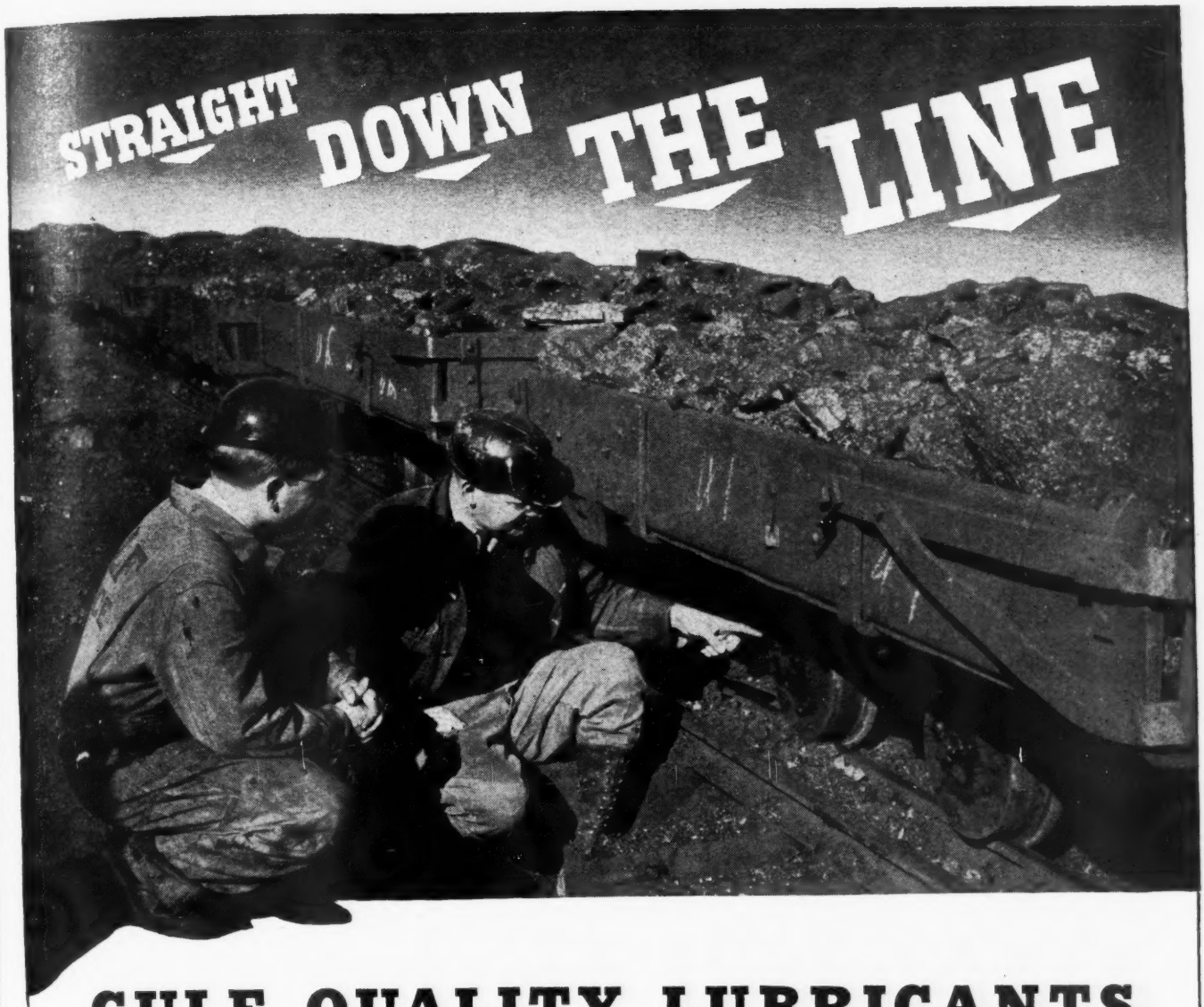
Week ended March 18	239.3
Month earlier	238.8
Year earlier	230.6

* *Business Week*, March 25.

Electric Power Output†

Week ended March 18, kw.-hr.	4,400,246,000
P.c. change from month earlier	−2.2
P.c. change from year earlier	+11.5

† Edison Electric Institute.



GULF QUALITY LUBRICANTS

reduce maintenance costs and insure maximum efficiency

To help keep your equipment out of the repair shop and operating at peak efficiency, take a tip from scores of leading mines that report definitely improved lubrication with Gulf higher quality oils and greases.

Gulf lubricants provide an extra margin of protection to vital parts—help prevent excessive wear that leads to production-sapping mechanical troubles. And here's another important plus value you get when you use Gulf lubricants: the helpful counsel of Gulf Service Engineers, *specialists in scientific coal mine lubrication.*

Make sure your equipment is getting the kind of lubrication that insures continuous production and maintenance economies. Write, wire, or phone your nearest Gulf office today and ask a Gulf Lubrication Service Engineer to call.

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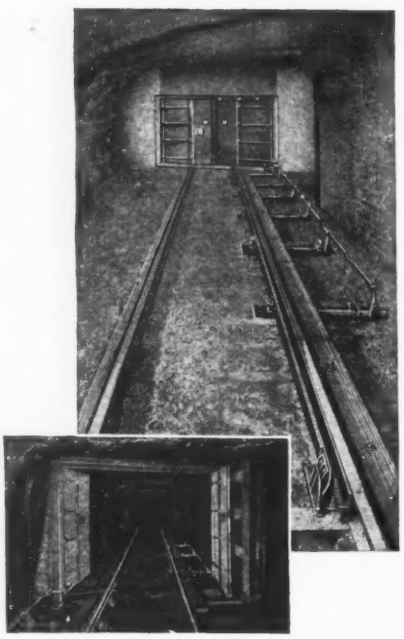
GULF BUILDING, PITTSBURGH, PA.

Back the Attack . . .
Buy more War Bonds

GULF INDUSTRIAL LUBRICATION

SAVE LIVES, TIME and MONEY with AMERICAN MINE DOOR

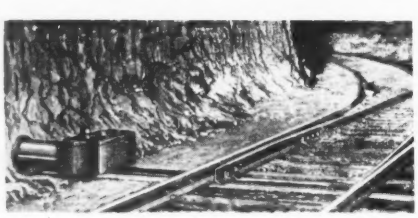


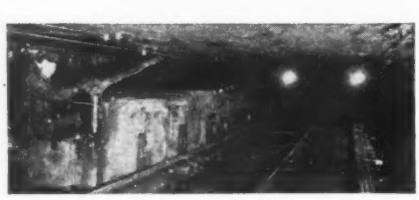
ECONOMICAL AUTOMATIC DEVICES . . .

Reduce Costs, Increase Tonnage!

THE AMERICAN AUTOMATIC DOOR . . . requires no attendant—opens automatically in a split second and closes same way when last car has passed—no slowing down on approach—thus trips are speeded up. Mechanical action is fast and positive. Air flow is maintained at constant speed to carry off accumulated gas.

THE CANTON AUTOMATIC SWITCH THROWER . . . does everything a switchman can do and does it faster with safety. Automatically throws switch points ahead or behind trip—or both. Trip maintains full speed. Switch can be operated by motorman, remote control or by hand and is adapted for use with automatic DERAILER.





SIGNALS . . . warn interfering trips and clear the way for non-stop main line trips. Prevent collisions and enable all trips to move with safety *and* speed.

These automatic devices make for perfect coordination of loading, transportation and tipple by eliminating lost time and speeding trips efficiently and safely. Our sales engineers will be glad to inspect and recommend installations that will save man hours, improve *safety*—no obligations. Canton devices pay for themselves—quickly. Complete catalogues on request.

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All Must Get Chance To Work, CMA Rules

An order relating to the application to "continuously manned jobs" of the Coal Mines Administrator's previous ruling that each employee must be given the opportunity to work on each of the days the mine produces coal during the week was issued March 16 over the signature of C. J. Potter, Deputy Coal Mines Administrator. Directed to all operating managers of coal mines in the possession of the government, the order follows:

"On Jan. 25, 1944, I issued an interpretation in supplementation of the Summary of Terms and Conditions of Employment dated Nov. 20, 1943, providing that each employee must be given the opportunity to work on each of the days that the mine produces coal during the week, even though such employee performs necessary maintenance and safety work on Sunday. The application of this ruling to employees in continuously manned jobs has raised practical problems which have been fully explored with the representatives of the United Mine Workers of America. As a result of those discussions, the following program has been agreed upon:

"Effective Monday, March 20, 1944, all employees in continuously manned jobs, whether or not they have heretofore worked under a swing-shift arrangement, must be given opportunity to work each of the days that the mine produces coal. Any such employee who has reason to believe that he will not be able to report to work will give the management notice of that fact in sufficient time to enable it to secure a replacement. The United Mine Workers of America has pledged its full cooperation in order that there be available at all times sufficient employees to fill the continuously manned jobs."

•

New Tipple Soon For Gunn-Quealy

Construction has begun on a new tipple at the Sweetwater mine of the Gunn-Quealy Coal Co., south of Rock Springs, Wyo., according to G. E. Sorensen, general manager. The new structure, all steel, is being constructed by the Allen & Garcia Co. to replace one destroyed by fire last September and is to be ready for use June 1.

•

16 Die in Mine Blast In West Virginia

An explosion early March 25 killed 16 men while they were trying to extinguish a fire in the Katherine No. 4 mine of the Katherine Coal Co., Lumberport, W. Va. When the fire broke out near the end of the 3,000-ft. slope, the entire crew of 75 was ordered to the surface. The 16 later trapped formed one of the fire-fighting crews that reentered the mine shortly before the blast.

READY AND WAITING

This Mack Model FC six-wheeler, with a capacity of 30 tons, is the largest standard truck built. It is especially adapted for use in quarries and strip mines, and for hauling of nickel, copper, iron and other ores.

THE post-war world won't be handed to us ready-made . . . but there will be a ready and waiting market for quarry and mining products. Housing, highways, perhaps new peacetime factories, dams and power-plants will keep supplier and builder busy for years.

Because of their proved ability to haul large tonnage at low cost, heavy duty motor trucks will have a vital part in this work, and far-sighted quarry and construction men are already giving close study to the selection of truck equipment best suited to their particular needs.

Plan *your* future operations now . . . with the advice of our engineers, men who know the job you face, and the kind of truck best fitted to do it. Address your inquiry to Public Works and Mines Division, Mack Trucks, Inc., 350 Fifth Ave., New York 1, New York.

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TRUCKS FOR EVERY PURPOSE

ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

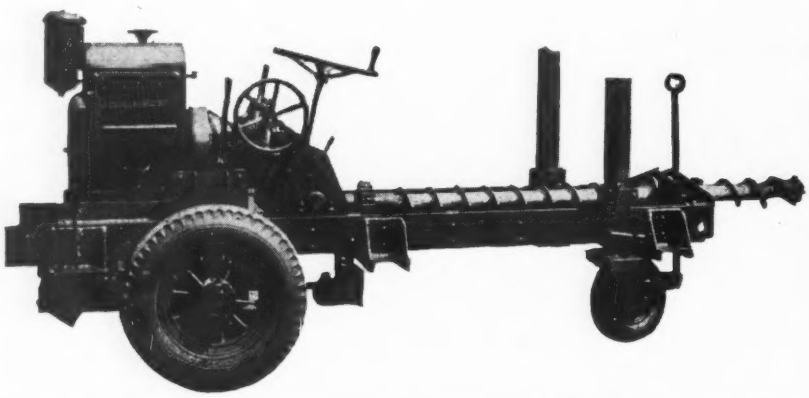
Mack Trucks, Inc., Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

PARMANCO Horizontal Drills

"Positive Control Drilling"

Parmanco Horizontal Drills give you "Positive Control Drilling." Parmanco Vertical and Horizontal Drills are today's leaders in low cost, low maintenance drilling—All Parmanco Drills are equipped with patented Parmanco augers. Used by leading strip mine operators—Write us your drilling problems.



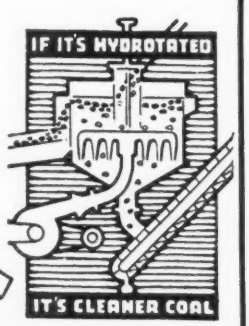
PARIS MANUFACTURING CO.

PARIS, ILLINOIS

WILMOT BUILDS BETTER BREAKERS

Keep THIS Important Fact in Mind in Planning Post-War Breaker Construction

Anthracite Preparation Plants Built by and/or Equipped by WILMOT are Showing Exceptional Yields and Maintaining Uniformly High Quality Standards



WILMOT

A GREAT NAME IN THE COAL INDUSTRY

HYDROTATOR *Preparation* EQUIPMENT

WILMOT ENGINEERING COMPANY, HAZLETON, PA.

Preparation Facilities

GASTON COAL CO., Alpoca, W. Va.—Contract closed with McNally-Pittsburg Mfg. Corp. for tipple and cleaning addition to replace obsolete equipment, to consist of mine-run crushing facilities, raw and washed coal screening at rate of 200 t.p.h., 3x3/8-in. raw coal to be washed at maximum rate of 100 t.p.h. in a new McNally-Norton automatic washing plant and facilities provided for properly dewatering and separating washed coal to three marketable sizes, with provisions for mixing combinations of these sizes; to be completed about July, 1944.

HOMESTEAD COAL CO., Earlington, Ky.—Contract closed with McNally-Pittsburg Mfg. Corp. for preparation plant to handle 250 t.p.h. of mine-run with screening and loading facilities to prepare three sizes of marketable coal; plant now in operation.

RALEIGH COAL & COKE CO., Mine No. 6, Raleigh, W. Va.—Contract closed with Jeffrey Mfg. Co. for tipple equipment having raw-coal-feed capacity of 275 t.p.h. of mine-run.

DEANGELIS COAL CO., Carbondale, Pa.—Contract closed with Deister Concentrator Co. for four SuperDuty diagonal-Deck No. 7 coal-washing tables for rice, barley and No. 4 buckwheat coals.

LOHR COAL CO., Schuylkill Haven, Pa.—Contract closed with Deister Concentrator Co. for two SuperDuty No. 7 coal-washing tables for No. 1 buckwheat and rice coals.

RYON COAL CO., Pottsville, Pa.—Contract closed with Deister Machine Co. for one No. 16 Deister Plat-O coal-washing table to clean No. 1 buckwheat at a rated capacity of 15 t.p.h.

WOODWARD IRON CO., Woodward, Ala.—Contract closed with Deister Machine Co. for one No. 16 Deister Plat-O coal-washing table to treat recrushed jig middlings.

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Association Activities

OPERATORS' ASSOCIATION OF THE WILLIAMSON FIELD reelected all its officers at its annual meeting. These include: L. E. Woods, president; C. A. Hamill, vice president; J. D. McLaughlin, treasurer, and J. J. Ardigo, secretary. Others at the meeting included Senator E. R. Burke, president, Southern Coal Producers' Association; J. V. Sullivan, secretary, West Virginia Coal Association; Jesse Redyard, chief, West Virginia Department of Mines, and G. M. Patterson, chief, Kentucky Department of Mines and Minerals.

•

Rock Fall Kills 3

A. B. Truitt, mine foreman; Lewis Hawkins, safety inspector, and a negro employee were killed Feb. 23 in Acmar No. 6 mine of the Alabama Fuel & Iron Co., Acmar, Ala., by a rock fall when they were working on ventilation in an old room.

AN INSURANCE PIONEER

Wherever you go among coal company insurance buyers, the name Bituminous Casualty is as well known as Columbus is to the school boy.

Twenty-seven or so years ago when coal mine owners couldn't buy Workmen's Compensation insurance—it was commonly regarded as too hazardous a risk—Bituminous Casualty Corporation stepped in and supplied it. A way was found to write it, with security and profit to the mine owner.

Today we write more Workmen's Compensation for the coal industry than any other carrier. Bituminous protection pays. Bituminous service saves.

ASSETS OVER $10,500,000

BITUMINOUS CASUALTY CORPORATION

ROCK ISLAND ILLINOIS

WORKMEN'S COMPENSATION—GENERAL LIABILITY AND PROPERTY DAMAGE INSURANCE

An Easy Way to Cut Maintenance Costs

Specify PROMET — THE Engineered BRONZE — Bearings and Bushings

Parts for Jeffrey, Goodman, Westinghouse, General Electric, Sullivan, and Joy Equipment, etc.

Specific formulae designed to best serve each requirement. Pioneers in Superior High Lead Bronzes and Alloys.

Machinists Prefer Promet

BAR STOCK . . . CORED OR SOLID because it machines easily.
Rounds, Hexagons, and Squares, in rough cast, semi-finished, or fully machined.
Cored bar stock available in all sizes (by ⅛" steps) from a ½" minimum core to 12" O.D. and 12' lengths.
PROMET BRONZE FORMULAE NO. 1—for light pressures at all speeds. Particularly useful in connection with high temperatures and faulty lubrication.
PROMET BRONZE FORMULAE NO. 18—for medium pressures at all speeds. A general all-around all-duty lubricating bronze with a large factor of safety.
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PROMET BRONZE FORMULAE NO. 89-S—for extra heavy duty and shock loads at medium to low speeds. Meets all exacting requirements demanding strength and hardness.

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Are you interested in buying or requisitioning mine supplies? If so, then you need this attractive new Mosebach Catalog No. 44. The entire line of Mesco mine supplies, such as *rail bonds, insulator switches, trolley wheels,* etc., is graphically illustrated to show appearance and application of many of the items. To simplify ordering, each product has been given a catalog number and there is no unnecessary hunting for what you want.

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1115 Arlington Avenue Pittsburgh, Pa.

H. F. DeBardeleben To Be Operating Head

H. F. DeBardeleben, who heretofore has served as vice president in charge of marine operations, DeBardeleben Coal Corp., Birmingham, Ala., was made executive vice president and general manager at the company's annual meeting. He will have charge of all operations. His headquarters will continue at New Orleans but his time will be divided among all divisions of the company.

Alvin W. Vogtle, named vice president in charge of traffic and sales, an employee of the company for 26 years, will be responsible for sales of coal, coke and by-products and his traffic responsibilities have been enlarged to include the marine transportation division.

Joe M. Goodwin, heretofore assistant general auditor, is the newly elected assistant secretary-treasurer.

The rest of the officers were reelected, including: Henry T. DeBardeleben, president; Milton H. Fies, vice president in charge of coal mining operations; T. J. Carpenter, vice president in charge of by-products operations; John W. Crawford, secretary-treasurer; and A. L. Wade (New Orleans), assistant secretary-treasurer.

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Obituary

JOHN L. KEMMERER, 74, chairman of the boards of the Kemmerer Coal Co., Frontier, Wyo., and Whitney & Kemmerer, Inc., coal selling organization, New York, died March 3 at his home in Short Hills, N. J., after a brief illness. His family had been interested in coal mining for several generations, Kemmerer, Wyo., having been named after it. Mr. Kemmerer began his career as a member of the law firm of Watson, Diehl & Kemmerer, Scranton, Pa., entering the coal industry about 40 years ago.

JOHN B. THOMAS, 59, general superintendent of mines, DeBardeleben Coal Corp., residing in Sipsey, Ala., died March 6 in the Mayo Hospital, Rochester, Minn., after a long illness. He had been connected with the company for about 20 years.

WILLIAM P. MORGAN, 66, maintenance superintendent, Susquehanna Collieries Co., died March 11 at his home in Nanticoke, Pa.

L. R. LIVINGSTON, general superintendent, Feds Creek Coal Co., Fedscreek, Ky., was instantly killed in an explosion March 23. He had prepared a dynamite charge to blow away old parts of a diesel engine and walked behind an old building 40 yd. away. When the charge let go a small part of the engine crashed through the building, killing Mr. Livingston.

JOHN D. ROGERS, vice president, Stonega Coke & Coal Co., Big Stone Gap, Va., died March 24, after several months of bad health. A graduate of Lehigh University, he had been with the company 28 years and served several terms as president of the Virginia Coal Operators' Association.

"Little out-of-the-way things often serve large purposes"★

"Thomas Robins was the pioneer of conveyor-belts . . . (He) revolutionized the conveyor-belt design . . . He developed the idea of idler pulleys and the troughed-shape belt... This idea was the best fundamental conception of a conveyor-belt" ★

WHEN THOMAS ROBINS introduced the rubber-covered, trough-shaped Conveyor Belt in 1891, it proved to be the opening of a new industrial era. Before the Belt Conveyor, quantities of raw materials—in mines, quarries, gas and cement plants—were handled in hundreds of tons per day. But with this invention, plants were erected which produced thousands of tons per hour.

When it was cumbersome and costly to handle materials, only the highest grade ores were mined. With the advent of the Belt Conveyor, it became possible and economical to utilize the low grade ores as well. Other minerals and materials which could not be handled by any other means became useful additions to the industrial economy.

With the Belt Conveyor, a single plant produces 1,000,000 tons of washed and sized limestone a month; a coke plant stores and handles 1,000 tons of coal an hour; a shipping pier unloads 6,000 tons an hour; a collier puts ashore her 10,000 ton cargo in five hours with only three attendants—and no shore-based equipment.

Without the Belt Conveyor, mass production might never have been achieved. Without Robins and its pioneering ingenuity—which created 41 "firsts" in a single decade—many materials handling problems might still remain unsolved. Solving difficult materials handling problems has been a Robins habit for half a century. Perhaps you face one now. Submit the facts to Dept. CA-4 for an impartial, non-obligating analysis.

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ROBINS CONVEYORS INCORPORATED
Founded in 1896 as Robins Conveying Belt Co.
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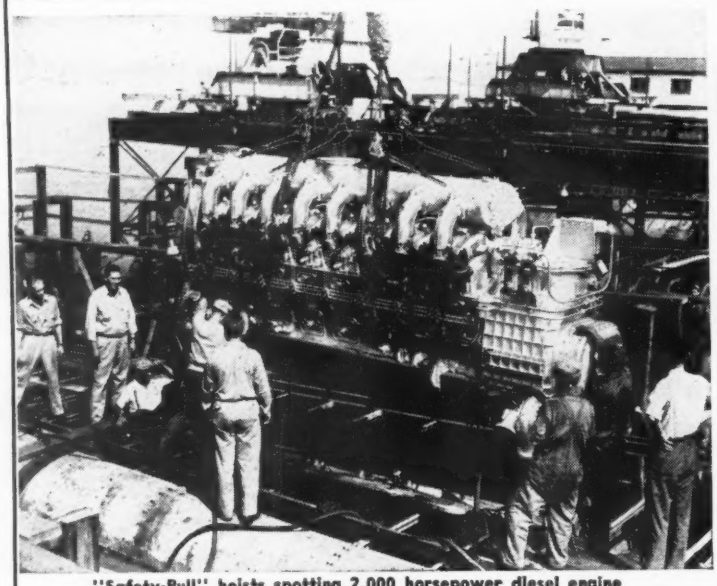
MATERIALS HANDLING MACHINERY

ROBINS *makes:* BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . **It's ROBINS**



"Safety-Pull" hoists spotting 2,000 horsepower diesel engine

The same **SIMPLE OPERATION**
in all sizes of "SAFETY-PULL"
RATCHET LEVER HOISTS

Side lever control for positive "up or down." A neutral position for safety control. Reversible handle permits the operating of hoist in any position. Safety stops prevent handle from spinning. Nine models from ¾ to 15 tons.

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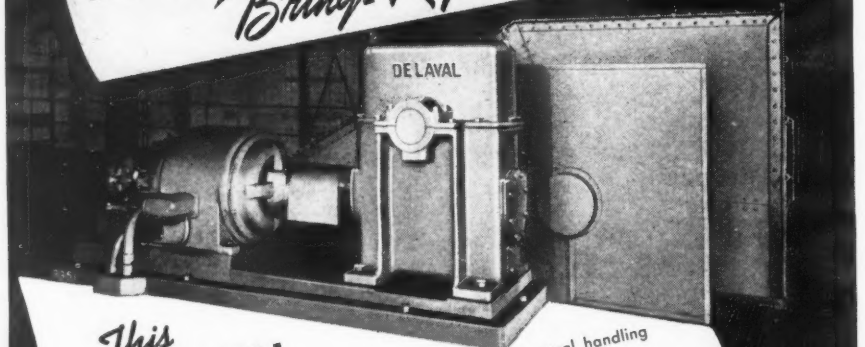
DANVILLE ILLINOIS

LONG-CONTINUED SATISFACTION *Brings Repeat Order!*



This
DE LAVAL
WORM GEAR of 32½ ratio was installed in a coal handling plant in 1928 to transmit 40 h.p. to drive an apron conveyor.

Recently the owners bought three more De Laval worm gears, two of them for conveyor drives.

Continuous operation in an atmosphere laden with abrasive dust or moisture has no terrors for a De Laval gear, which is self-contained and self-lubricating and requires no attention further than an occasional checking of the oil level.

Process plants find in mechanical conveyors with De Laval worm gear drives a superior and economical means for moving materials steadily in large quantities over long distances.

Our engineers will be glad to study your requirements and to assist with data and layouts. Ask for Publication W-1133.

DE LAVAL WORM GEAR DIVISION
of the De Laval Steam Turbine Co., Trenton, N. J.

Wages Rises Unlikely For Men Under WLB

Admitting it to be unlikely that the War Labor Board will be disposed to recede from its position in denying a blanket salary or wage increase for coal-mine employees exempt from union membership and under jurisdiction of WLB, the petitioners, the chairmen of the negotiating committees representing the Northern and Southern Appalachian groups, in an open letter dated March 1 and addressed to all secretaries of coal associations in the Appalachian region recommended that:

"Individual operators make application to their respective Regional War Labor Boards for authority to increase the wages or salaries of individual exempt employees coming under the jurisdiction of the War Labor Board. In doing so it is important to show to the fullest extent possible the close relationship existing between exempt employees for whom you are making application and members of the United Mine Workers of America, and it is also suggested that you quote in your application paragraphs Nos. 2 and 3 of the War Labor Board's Order of Feb. 4, 1944, Case No. 13-342."

The original petition for a blanket increase was filed with WLB Dec. 4, 1943, and after 60 days of watchful waiting was denied by the Board Feb. 4. Petition for reopening and reconsideration was filed Feb. 10. No formal action has been taken by the Board, but the petitioners now say, "We have a feeling that they will refuse to reopen this case."

COMING MEETINGS

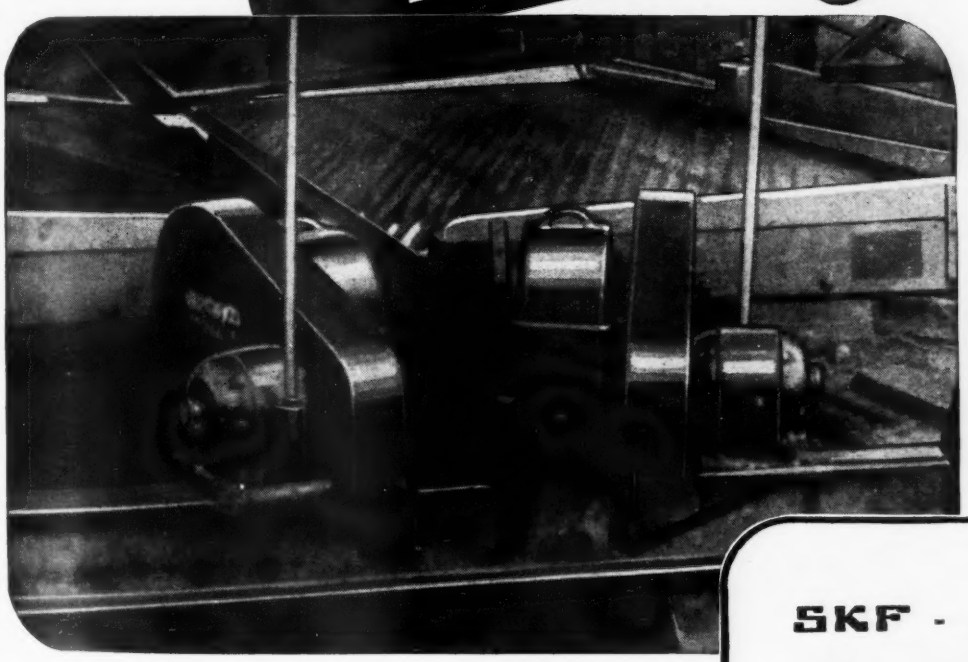
- **Midwest Power Conference: annual meeting, April 13 and 14, Palmer House, Chicago.**
- **American Mining Congress: Coal Mine War Conference, May 1 and 2, Netherland Plaza Hotel, Cincinnati, Ohio.**
- **Mine Inspectors' Institute of America: annual meeting, June 5 and 6, Daniel Boone Hotel, Charleston, W. Va.**
- **Rocky Mountain Coal Mining Institute: annual meeting, June 8-10, Cosmopolitan Hotel, Denver, Colo.**
- **Smoke Prevention Association: annual meeting, June 6-9, Hotel Statler, Detroit, Mich.**
- **American Retail Coal Association: annual meeting, June 7, Morrison Hotel, Chicago.**
- **Illinois Mining Institute: annual summer meeting and boat trip, June 9-11, aboard Str. "Golden Eagle" from St. Louis.**
- **American Society for Testing Materials: annual meeting, June 26-30, Waldorf-Astoria Hotel, New York City.**

COMPACT *head motions*

WORK IN CRAMPED QUARTERS

Working in cramped quarters is no hardship for the compact SKF-equipped Concenco Head Motions on these No. 7 SuperDuty Diagonal-Deck Coal Washing Tables. Because available space was limited for installing four tables the close setting was necessary, making the equipment almost inaccessible for easy lubrication or repairs. With the "always there" assurance of SKF Bearings in the head motions, the crowded condition offers no perplexing problems. The equipment runs merrily along throughout the years with minimum bearing attention. Another advantage that SKF's have brought to coal operators. 5533

SKF INDUSTRIES, INC., PHILADELPHIA 34, PA.



ARMY E NAVY

SKF - EQUIPPED

Head Motion

Built by
The Deister Concentrator Co., Inc.

One-half of air pumped never reaches the face — You can better that percentage at your mine with —

Try the "Blow-Torch Test"

MOROPA

COTTON BRATTICE CLOTH

This is no time to risk production losses through faulty ventilation . . . . MOROPA COTTON BRATTICE CLOTH, as proved in the mines of many leading producers, is the soundest choice for the safety that allows you to boost vital production.

A careful examination of MOROPA'S characteristics reveals the reasons for its acceptance. MOROPA is Flame-Resistant, has low Porosity, Resists Mildew, and gives Maximum Wear.

See data on MOROPA, page 123 of the 1943 Coal Mining Catalog . . . or write us! MOROPA comes in standard widths up to 84 inches.

Moropa

. . . . made in America, of American Cotton, manufactured by . . . .

Act today to eliminate unnecessary ventilation risks . . . . install MOROPA.

JOHN FLOCKER & COMPANY

642 GRANT ST. EST. 1822 PITTSBURGH, PA.

What 2 BEARING CONSTRUCTION means to YOU!

• To enumerate all the advantages of Plat-O Vibrating Screens requires a 20-page catalog ("Better Sizing, Cheaper"—send for your copy today).

So let's talk about just one feature: BEARINGS.

A Plat-O Vibrating Screen has only two bearings. But what bearings! Both are oversize SKF spherical roller bearings—rugged and sturdy. They are lubricated by the oil bath method and neither bearing supports any of the screen's weight.

Result? Bearing life is greatly extended . . . maintenance woes are reduced, lost time is eliminated . . . production is maintained at the highest level, production costs at the lowest.

Here is but one instance of the meticulous care that enters into every feature of Plat-O design and construction . . . but one of the many reasons why operators everywhere are boosting production and profits with Plat-O Vibrating Screens.

DEISTER MACHINE COMPANY
Fort Wayne 4, Indiana

EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the Bureau of Mines in February, as follows:

Goodman Mfg. Co.—Type 424-BJ slabbing machine (redesigned): two motors, 12 and 50 hp., 250 and 500 volts, d.c.; Approvals 497 and 497A; Feb. 26.

Jeffrey Mfg. Co.—Type CS-6227 trailer water tank; 1-hp. motor, 250 volts, d.c.; Approval 498; Feb. 26.

New U. P. Operation

Augmenting production of old mines in the Rock Springs district of Wyoming, Stansbury mine of the Union Pacific Coal Co., which started operations in January, is climbing steadily toward its ultimate capacity output of 5,000 tons daily.

The new mine is seven miles north and two miles east of Rock Springs. Its developed reserves have been placed at 35,000,000 tons in six seams disclosed by diamond drilling exploration. Output, which at the beginning of production was about 1,000 tons per day, is to be increased gradually until a daily tonnage of 5,000 is recovered, which is expected to be reached in two years.

•

Strain Gets Tono Mine

Acquisition of the coal mine at Tono, northeast of Centralia, Wash., from the Bucoda Coal Co., which has operated it since 1931, has been announced by officials of the Strain Coal Co., Renton, Wash. C. A. Grey is superintendent for the new operators, succeeding George Morris, who is opening a new mine near Mendota. For many years the Tono mine, which was opened in 1907, had the largest single-slope operation in the Northwest. It has a 22-ft. seam.

•

Sahara Shifts Staff

Frank H. Woods has resigned as president and chairman of the board of the Sahara Coal Co., after 26 years as chief executive of the company and its predecessor. He will continue an active member of the board.

Henry C. Woods has been elected chairman of the board, but will continue to serve as a vice president. He joined the company in 1921, was elected a director in 1923, served as secretary, 1925-28, and then became vice president.

Frank H. Woods Jr. has been named president and treasurer. He became associated with the company in 1933 as assistant to the president, became a director four months later, was made a vice president in 1936 and vice president and secretary-treasurer in 1938.

Paul Halbersleben, for many years general superintendent of mines, has been elected a director.

EUCLIDS ARE "Made to Order" FOR TOUGH HAULING JOBS

● Hauling payloads of 15 to 30 tons over difficult off-the-highway hauls is the job for which Rear Dump and Bottom-Dump EUCLIDS are designed and built. Overburden and ore hauling in open pit mines, construction of roads, dams, levees, airports and military installations—these are the types of jobs on which Euclids have proved their efficiency and versatility.

For your present and future hauling equipment requirements, check Euclid job-proved performance for low hauling costs. Your Euclid distributor or representative will be glad to supply helpful facts and figures.

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CLEVELAND 17, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT
For EARTH ROCK COAL ORE

YOUR GREEN LIGHT TO REPEAT SALES...

Coal dustproofed NOW with Wyandotte Calcium Chloride

• Keeping dealers and consumers happy *today* with clean coal — coal that's been *dustproofed*—has a sales appeal that means bigger post-war profits for *you* when sales competition is again hot and heavy. And for dustproofing that tells its own success story—treat your coal with Wyandotte Calcium Chloride!

• Customers always prefer coal that can be handled with a minimum of dust, dirt and messiness in general. Dustproofed coal has a sheen that is its own advertisement—and turns householders' thoughts less to oil and gas as replacement fuels.

• Treatment with Wyandotte Calcium Chloride is speedy, dependable and safe—takes little time and less expense. Investigate today the advantages of this process—one of your own very best salesmen for your coal. Write for information and literature.

Wyandotte Chemicals Corporation
MICHIGAN ALKALI DIVISION
Wyandotte, Michigan

Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

Name .....

Address .....

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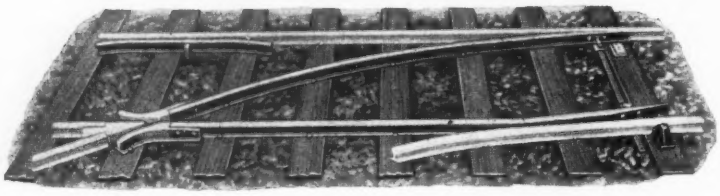
Wyandotte REG. U. S. PAT. OFF. **CALCIUM CHLORIDE**

WYANDOTTE CHEMICALS CORPORATION
MICHIGAN ALKALI DIVISION, Wyandotte, Michigan

KEEP More COAL ROLLING FASTER with DEPENDABLE FROGS and SWITCHES

WEIR KILBY

Titan Frog, Long Arm Turnout



The Titan Frog is furnished in Titanium or Manganese treated steel. In combination with the proper switches, stands, etc., it is easily installed; used right or left hand; saves joint bars.

Weir products for mine track work include a wide variety of constructions in frogs, switches, guard rails, clamps, stands, etc.

➡ Our new CATALOG "H," replete with photos, drawings and specifications, covers every track work need. Copy on request.

Suppliers to Mines and Railroads for more than 60 years

WEIR KILBY CORPORATION
Established 1882
CINCINNATI 12, O. **BIRMINGHAM 7, ALA.**

HANDLE BLASTING CAPS WITH CARE

During 1943, more boys and girls were injured in playing with blastingcaps than in the preceding year. Children hammer or pick at them, throw them in bonfires or against walls. The resulting explosion throws particles of metal in all directions. Fingers are blown off, hands are often crippled, eyes destroyed. In some cases, the children are killed. Many times children are so injured that they are rendered unfit for useful work in later life. The Institute of Makers of Explosives, 103 Park Ave., New York City, warns against carelessly leaving caps lying about after blasting operations where they may fall into the hands of children and cause serious injury.

Shasta Coal Corp. To Produce Aug. 1

Shasta Coal Corp. has been organized to operate in Sixth Vein strip coal near Edwardsport, Ind., with these officers: R. E. Snoberger, president; Hubert E. Howard, vice president; Ben H. Schull, operating vice president, and George A. Merchant, secretary and treasurer. The new organization has entered into a contract with the Defense Plant Corp. to supply war industries coal. It will be provided with $1,400,000 of federal money for plant facilities, according to an announcement by Jesse Jones, Secretary of Commerce.

Machinery of the Binkley Coal Co. is to be leased to Shasta for the period of the emergency and, with Binkley employees, production estimated at 850,000 tons annually is to begin about Aug. 1. The coal is to be sized and prepared at the mine.

•

Armco Creates Mining Division

American Rolling Mill Co., with main office at Middletown, Ohio, has created a mining division which will have direction of operation of coal-mining properties, both parent company and subsidiary. Charles W. Connor, formerly general superintendent of mines for Armco, has been appointed manager of the mining division, and Mr. Connor announced the appointment of C. E. Hough as general superintendent of mines for Armco and subsidiaries. Mr. Hough, who formerly was assistant to the vice president of the New River Co., Mt. Hope, W. Va., has assumed his new duties. Mr. Connor will continue as vice president of the Colcord Coal Co. and Colcord Coal Sales Co., both affiliates of Armco.

Paul R. Maxey, formerly chief mining

Have your drainage problems **BACKED UP** *on you ?*

Now Available WYCKOFF WOOD PIPE FOR MINE DRAINAGE

Due to the fact that the Government required a large amount of Wyckoff Wood Pipe in connection with the War effort, which consumed our entire Plant capacity, we have been unable to take care of the needs of our customers for the past two years.

Now we are pleased to announce that we are in a position to make prompt deliveries and hope that we may be of service to you.

The rainy season will soon be here and we hope you will let us know as soon as possible what your needs are going to be this Spring while we are in a position to take care of you.

Wyckoff Wood Pipe has an 89 year record of perfect resistance to the corrosive action of sulphurous mine water. It's an ideal, long-time investment — light — easy to lay—and relatively low in first cost.

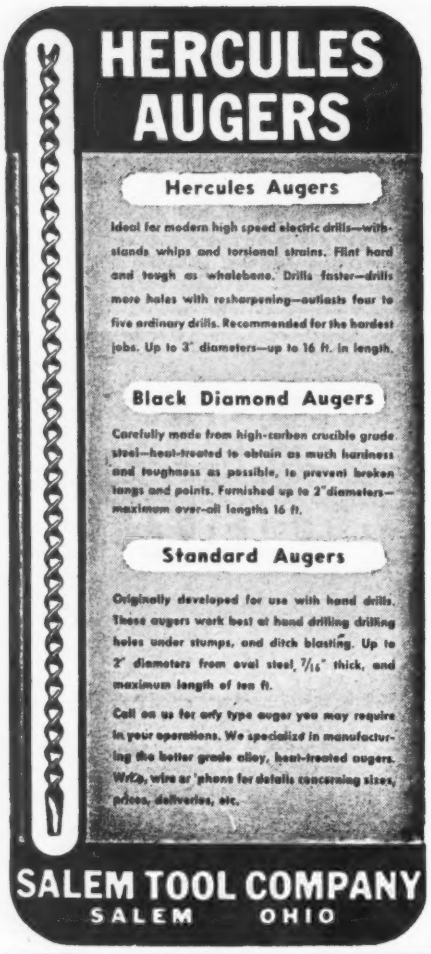
We also manufacture a special Hard Maple Pipe for flushing culm in the Anthracite Region and wood covering for underground steam lines.

Write today.

A. WYCKOFF & SON CO.

OFFICE and FACTORY: No. 35 HOME STREET, ELMIRA, N. Y.

THE ORIGINATORS OF MACHINE MADE WOOD PIPE


HERCULES AUGERS
Hercules Augers
Ideal for modern high speed electric drills—withstands whips and torsional strains. Flint hard and tough as whalebone. Drills faster—drills more holes with resharpening—outlasts four to five ordinary drills. Recommended for the hardest jobs. Up to 3" diameters—up to 16 ft. in length.
Black Diamond Augers
Carefully made from high-carbon crucible grade steel—heat-treated to obtain as much hardness and toughness as possible, to prevent broken tangs and points. Furnished up to 2" diameters—maximum over-all lengths 16 ft.
Standard Augers
Originally developed for use with hand drills. These augers work best at hand drilling drilling holes under stumps, and ditch blasting. Up to 2" diameters from oval steel, 7/16" thick, and maximum length of ten ft.
Call on us for any type auger you may require in your operations. We specialize in manufacturing the better grade alloy, heat-treated augers. Write, wire or 'phone for details concerning sizes, prices, deliveries, etc.
SALEM TOOL COMPANY
SALEM OHIO

engineer for the American Rolling Mill Co. and Colcord Coal Co., has been appointed superintendent of the Montcoal and Stickney mines of the Colcord Coal Co., vice Wayne M. Davis, resigned.

•

Illinois Group Studies Induction Heating

"High-frequency induction heating is not new, but it was not used in industry until the last 10 years," declared Dr. Harry B. Osborn Jr., development engineer, Ohio Crankshaft Co., Cleveland, Ohio, sponsoring the "TOCCO" process before the March meeting of the Southern Illinois Mining Electrical Group, West Frankfurt, Ill. "The Ohio Crankshaft Co., in searching for a better way to harden the wearing surfaces of crankshaft bearings, found that induction heating produced such astonishing results that the tail now wags the dog." In other words, the business of building induction heating equipment has far outstripped the manufacture of crankshafts.

Some of the scientific facts uncovered in these 10 years of research and practical application are: finished surfaces can be hardened without scaling; repeated operations get identical results; the time required is seconds compared to minutes—or even hours—required by other methods; there is no warping of the part; carbon steels may sometimes be used where alloy steels would be required if other hardening processes were used; induction heating is a great saver of time for soldering and brazing; the heated zone may be very exactly limited, making it ideal for some forging processes.

Heating and quenching may be a continuous process, as in treating a rod or a wire by passing it at a uniform rate through the heating and quenching zones. By the proper shape of the current-carrying coil or by varying the number of turns, various shaped sections or parts may be successfully treated. For many applications a single turn of the coil is all that is necessary.

The principle of induction heating is that of a transformer, in which the part to be heated is the secondary. The actual heating is due to hysteresis and I^2R losses if the part is made of magnetic material, as steel, and to I^2R losses only if it be of non-magnetic material, as silver.

Because of cost and space requirements, motor-generator sets delivering 9,600-cycle single-phase current are preferred to spark-gap or tube-oscillator equipment for the current supply for most heating applications. For quite small diameter parts much higher frequencies are necessary. For such work tube or spark-gap equipment must be used.

High-frequency currents tend to travel on the surface. That fits in with the hardening of wearing surfaces. To get deep penetration of heat, time is required as well as relatively low frequency. For a large percentage of industrial jobs, the 9,600-cycle motor-generator is satisfactory, with a variety of coil shapes and sizes to be used for various parts. All these coils are used with the one motor-generator. Heating is so nearly instantaneous and so strictly localized that most treated parts may be handled with bare hands.

Many installations have been made in a wide variety of plants doing war work. These have demonstrated that machines built from induction hardened parts are both superior to and cheaper than where parts are hardened by gas heating. Etched cross-sections of hardened parts indicate the penetration of induction heat is gradual and without any trace of lamination. In practice there is no such failure as spalling of sections due to unrelieved strains set up by the hardening process.

•

Coal Publications

Low-Temperature Distillation Yields of Primary Tar and Light Oil From Coals of Various Ranks and Types, by W. H. Ode and W. A. Selvig, U. S. Bureau of Mines, R. I. 3478, 11 pp., 8x10½ in., mimeograph; paper. Yields depend on chemical content of coals. Tar and light oil can be correlated with hydrogen content and with volatile matter less 1.3 x oxygen content.

Ohio's Mineral Resources; I—*Coal*, by Wilber Stout; II—*Gypsum*, by E. L. Lintner, Ohio State University Studies, Engineering Series, Engineering Experiment Station, Circ. No. 45, 30 pp., 6x9 in., paper. Mostly history. State has 53 beds, 17 mined for railroad shipment; 18 only

Coal Production Depends on Haulage...
W.VA. RAIL CO.
...Haulage depends on Good Track!
To help you "keep 'em rolling" we can assure PROMPT DELIVERY on a number of standard track equipment replacement parts—among them the Switch Stand shown above.
Check these design and construction extras:
• Smooth toggle action gives increasing pressure as switch points close.
• Extremely low but with grip and lever so positioned that the latter when rapidly thrown will not endanger the operator's feet, thus removing a fault common to many stands.
• Crank aligned with switch bar avoiding an offset in connecting rod and consequent bending and springing.
• Amount of throw easily varied by means of screw crank arm.
• Both crank and lever shafts have solid reamed double bearings, eliminating wear that occurs in ordinary type overhung or split bearing designs.
Write today . . . list those items you need . . . or call in a West Virginia Rail Engineer. He'll go over your track equipment with you and make recommendations.
WEST VIRGINIA STEEL & MFG. COMPANY
Formerly The West Virginia Rail Company
HUNTINGTON WEST VIRGINIA

POINTING THE WAY TO

Greater Tonnage!

The Original A.V.C. Construction

1. Flexible tinned copper conductor, perfectly and permanently centered in helically applied insulation.
2. Paper separator makes stripping easy, prevents insulation from sticking to conductor.
3. Impregnated heat, flame and moisture resistant felted asbestos insulation that withstands conductor-heating overloads and won't dry out, become hard and brittle, or burn.
4. Varnished cambric for high dielectric strength and added moisture resistance, protected from heat, flame and oxidation by two felted asbestos walls.
5. Outer felted asbestos wall which serves as an effective heat-barrier against high ambient temperatures.
6. Heatproof, fireproof asbestos braid, resistant to moisture, oil, grease and alkalies, is diametered to properly fit bushings.

For sizes and diameters refer to McGraw-Hill Coal Mining Catalogs or write to Rockbestos Products Corporation, P. O. Box 1102, New Haven, Conn.

122 different wires and cables have been developed for severe operating conditions by Rockbestos

ROCKBESTOS A.V.C. MINING CABLE

Keeps Equipment Producing on Schedule

Every time a cutter, loader or locomotive takes time-out for an internal rewiring job, production drops . . . and everyone loses; the miners, mine operators and consumers of coal. Keep mining machines on the job by rewiring with Rockbestos A.V.C. Mining Cable . . . the cable used by equipment manufacturers and mine electricians for the past 15 years. This time-tested cable has a *permanent* impregnated asbestos insulation that is heatproof and won't ignite or burn even under copper-melting arcs. It stands up under oil, grease and alkalies, and won't bake brittle, crack, bloom, rot, swell or flow. Write for a sample . . . put it through your own tests...and you'll readily see why the use of Rockbestos A.V.C. Mining Cable for connections between controllers and resistors, coil connections and motor leads, points the way to greater tonnage by practically eliminating cable failures in mining equipment.

ROCKBESTOS A.V.C.

The Cable with Permanent Insulation

ORDER FROM THESE JOBBERS—SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.:	Beckley Mach. & Elec. Co.	EVANSVILLE, IND.:	Evansville Elec.& Mfg. Co.	MIDDLESBORO, KY.:	Rogan & Rogan Co.
BIRMINGHAM, ALA.:	Moore-Handley Hdwe. Co.	FAIRMONT, W. VA.:	Fairmont Supply Co.	PITTSBURGH, PA.:	Upson-Walton Co.
BLUEFIELD, W. VA.:	Superior-Sterling Co.	HUNTINGTON, W. VA.:	Banks-Miller Supply Co		Westinghouse Elec.Supply Co.
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FOR VICTORY—GET OUT COAL and INVEST IN U. S. WAR BONDS

A SERVICE THAT HELPS YOU RECOVER MAXIMUM VALUES

The skill of experienced Galigher engineers and the facilities of a well equipped pilot laboratory are at your service in the urgent wartime task of preventing waste and conserving precious raw resources. Our tested methods for the recovery of values are now applicable to the processing of coal and other non-metallics. Hence a large background of knowledge, already existent, is available to you in the solving of specific problems of separation. Our engineers work in the laboratory and in the field to the end of helping industry streamline its entire mill operation.

Your correspondence is invited

"There Is No Substitute For Service And Experience"

THE GALIGHER COMPANY

48 S. 2nd EAST ST. METALLURGICAL DIVISION SALT LAKE CITY, UTAH

for local consumption and 18 are too thin or too dirty for use.

The History of Miners' Diseases, a Medical and Social Interpretation, by George Rosen, M.D. 490 pp., 6x9½ in., cloth. Schuman's, New York. Price, $8.50. Emphasis laid on history prior to present century, as author expects to cover this century's developments later in another volume.

Coal Preparation, Edited by D. R. Mitchell, with contributions by 35 authors, Seely W. Mudd Series, American Institute of Mining and Metallurgical Engineers. 729 pp., 6x9¼ in.; cloth. Price, $6 (one copy to members, $2.50). Covers the entire subject from face preparation to loading, including coal characteristics, sampling, coal specifications, screening, breaking and crushing, preparation at face, hand picking, mechanical cleaning, dewatering, dedusting, dust collection, treatment of coal surfaces, plant operation and control.

Questions and Answers on the Use of Fuel Oils for the Dustless Treatment of Coal. Bituminous Coal Research, Inc. 5 pp., 8½x11 in.; mimeograph; paper. Use of Nos. 5, 6 and bunker C fuels having A.P.I. gravities of 20 deg. or below may be used for spraying. Some such oils are suitable for this purpose. Viscosity must suit type of coal, must have flash point not less than 225 deg F., pour point for winter use not higher than 25 deg.

Blast Hole Diamond Drilling, by Olaf V. Lindqvuist. J. K. Smit & Sons, Inc., New York. 53 pp., 6x9 in.; paper. Small drilling bortz, mechanical setting of bits and light, small, fast rotating drilling machines have made several Canadian metal mines favor use of diamond drills for blasting. Drilling costs have been reduced 30 to 60 percent in hard rock by use of diamonds.

•

Mine Fatalities Show Slight Rise

Accidents at coal mines of the United States caused the deaths of 84 bituminous and 14 anthracite miners in January last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 53,800,000 net tons, the accident death rate among bituminous miners in January last was 1.56 per million tons, compared with 1.43 in the preceding month and 2.28 in January, 1943.

The anthracite fatality rate from accidents in January last was 2.86, based on an output of 4,887,000 tons, against 2.21 in the preceding month and 1.80 in the first month of 1943.

For the two industries combined, the accident fatality rate in January last was 1.67, compared with 1.49 in the preceding month and 2.24 in January a year earlier.

Fatalities during January last, by causes and states, as well as comparable rates for 1943 and 1944, were as follows:

U. S. COAL-MINE FATALITIES IN JANUARY, 1944, BY CAUSES AND STATES

State	Underground: Falls of roof	Falls of face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other causes	Total Underground	Shaft	Open-cut	Surface	Grand Total
Alabama	..	..	1	..	..	..	..	..	1	..	..	..	1
Colorado	..	2	..	..	..	..	1	..	3	..	..	..	3
Illinois	1	..	4	..	..	..	..	..	5	1	..	..	6
Iowa	1	..	..	..	..	..	..	..	1	..	..	..	1
Kansas	1	..	..	..	..	..	..	..	1	..	..	..	1
Kentucky	5	..	..	..	1	1	..	..	7	..	1	2	10
New Mexico	..	..	..	..	..	1	..	..	1	..	..	..	1
North Dakota	..	..	..	..	..	..	..	..	..	1	..	..	1
Ohio	3	..	1	..	..	..	..	..	4	..	1	1	6
Oklahoma	2	..	1	..	..	..	..	..	3	..	..	..	3
Penna. (bituminous)	7	..	3	..	..	..	2	..	12	..	..	..	12
Tennessee	1	..	..	..	..	..	..	..	1	..	..	..	1
Utah	3	..	..	..	..	..	..	..	3	..	..	..	3
Virginia	3	..	3	..	..	..	..	..	6	..	..	..	6
West Virginia	16	..	8	..	..	..	1	1	26	..	..	2	28
Wyoming	1	..	..	..	..	..	..	..	1	..	..	..	1
Total bituminous	44	2	21	..	1	2	4	1	75	2	2	5	84
Penna. (anthracite)	6	..	3	1	3	..	..	..	13	..	..	1	14
Grand total	50	2	24	1	4	2	4	1	88	2	2	6	98

DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS

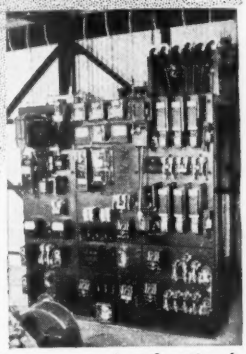
January, 1943 and 1944

Cause	Bituminous: Number Killed		Killed Per Million Tons		Anthracite: Number Killed		Killed Per Million Tons		Total: Number Killed		Killed Per Million Tons	
Underground:	1943	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943	1944
Falls of roof and coal	57	46	1.192	.855	1	6	.225	1.227	58	52	1.110	.887
Haulage	14	21	.293	.390	3	3	.676	.614	17	24	.325	.409
Gas or dust explosions:												
Local	4*	....	.083	....	...	1	....	.205	4	1	.077	.017
Major	....	....	....	....	...	...	....	....	....	....	....	....
Explosives	2	1	.042	.019	1	3	.225	.614	3	4	.058	.068
Electricity	2	2	.042	.037	...	...	....	....	2	2	.038	.034
Machinery	2	4	.042	.074	...	...	....	....	2	4	.038	.068
Shaft	1	2	.021	.037	...	...	....	....	1	2	.019	.034
Miscellaneous	13	1	.272	.019	1	...	.225	....	14	1	.268	.017
Stripping or open-cut	6	2	.126	.037	...	...	....	....	6	2	.115	.034
Surface	8	5	.167	.093	2	1	.450	.205	10	6	.191	.102
Total	109	84	2.280	1.561	8	14	1.801	2.865	117	98	2.239	1.670

* All figures subject to revision.

PRODUCTION TONNAGE BOOSTERS

Full-automatic switchboards save manpower

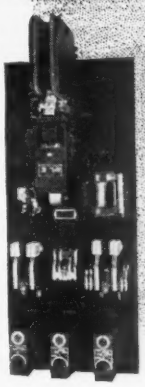


Automatic switchboards for service with M-G sets and rotary converters are controlled by clock or remote push-buttons. Operating without attendance, except for periodic inspection and maintenance, automatic switchboards can be situated so as to provide good voltage at the working face. They are so designed by I-T-E that they can readily be relocated and kept close to load underground centers. A complete switchboard is assembled quickly in any convenient location by fastening free-standing frames together with a few bolts. Standard boards require no sills, wall braces or other supports.

I-T-E automatic controls protect against all electrical emergencies met with in mechanized mining operations. These include low a-c voltage with automatic restart, a-c overload, converter field failure, phasing faults, incomplete start, reverse current or polarity conditions, d-c short circuit and d-c overload.

Illustrated is a typical three-panel board of standard height.

"KSA" keeps power flowing

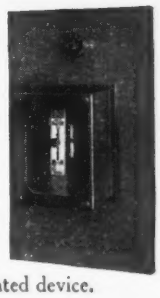


Frequency with which overload peaks and faults arise on long trolley systems calls for means of reducing outages to shortest periods. The Type KSA automatic reclosing circuit breaker was designed specifically for this purpose. It opens the circuit when opening is necessary and restores service automatically as soon as line conditions warrant. Ability to measure line conditions is inherent in the device, so that the circuit breaker "knows" instantly when a fault has been cleared or the load has been reduced to a safe value.

Since action is automatic and the need of attendance reduced, smaller generating units located nearer load centers may be employed. This further improves voltage conditions and reduces cause of outages.

Illustrated is Type KSA for feeder-generator application. It incorporates two means of measuring line conditions (1) measuring the load and (2) measuring voltage difference.

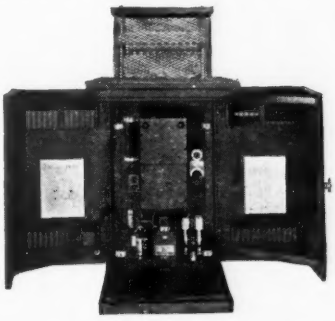
"Distributors" equalize the load



Type LDR Load Distributors make a direct contribution to peak tonnage in mechanized mines by avoiding frequent opening of circuit breakers, particularly those outages arising from unequal distribution of load among widely separated substations operating in parallel. Loads on either M-G sets or rotary converters are kept in balance by automatic transfer under peak conditions. Not only is overheating with resulting outages reduced but necessity of maintenance is greatly lessened. Illustrated is the standard, panel-mounted device.

Sectionalizing gives steadier production

Type KSC automatic reclosing circuit breakers are used in mechanized mines to prevent interference between sections. Trolley and feeder disturbances are limited to the areas in which they originate and distant stations cannot feed into a faulted section. Improved voltage conditions which sectionalizing assures keep losses of production time to a minimum. Maintenance on mining and loading machines is reduced since the equipment is not called upon to operate on abnormally low voltage.



Illustrated is a Type KSC sectionalizing circuit breaker for installation underground. The steel enclosure, shown open, not only protects the operating mechanism but also aids in permitting the circuit breaker to be quickly installed and easily relocated for best protection of the system.

Distant trolley circuits protected

Type ETB Trolley Wire Protector is used to prevent needless damage from high-resistance "shorts" on trolley feeders in remote and rarely frequented sections of the mine. It is a circuit breaker whose operating characteristics are properly related to the heating characteristics of 4/0 copper wire. This Protector should be viewed as insurance against costly fire hazards and as prevention of needless penalizing of electrical service elsewhere. Illustrated is a Protector in a sheet-steel enclosure arranged for padlocking.

Representatives in Principal Mining Areas

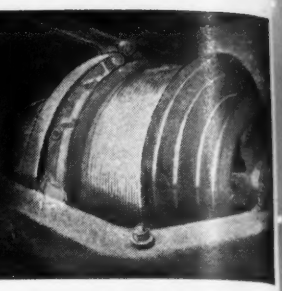
I-T-E AIR SWITCHGEAR

IMMERSED IN AIR — ENCASED IN STEEL

The Army-Navy "E" for Production Excellence

I-T-E CIRCUIT BREAKER CO., PHILADELPHIA 30, PA.

TIPS FROM MANUFACTURERS



Lubrication

Sun Oil Co., Philadelphia 3, Pa., offers its "Save and Serve" lubrication campaign as a vital item in machinery maintenance. Asserting that the right lubricant in the right place can effect substantial savings in labor required for repairs and extra maintenance and make it available for use elsewhere, make equipment last longer and produce more, and cut down time wasted by unnecessary breakdowns, the company lists the following printed pieces as available to all manufacturing industries adopting the plan:

Lubrication booklet describing the basic do's and don'ts of industrial lubrication and the handling of petroleum products.

Wall chart containing all of the points in the booklet in briefed form—the chart to be posted on bulletin boards where maintenance men and machine operators can read it.

Plant poster driving home the value of proper lubrication—to be placed in strategic points throughout the plant where all employees can see it.

Industry folders giving case histories of savings attained by application of proper lubricants—supplying actual proof of the value of proper lubrication in each particular industry.

Technical bulletins giving engineering information on the application of lubricants to various types of industrial machinery—including information on mining equipment, air compressors, hydraulic installations and other equipment.

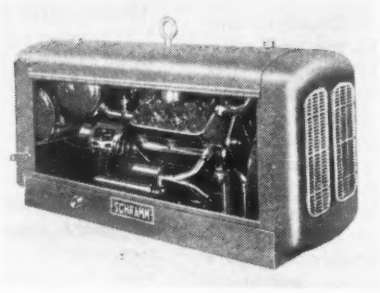
Maintenance memos to aid maintenance men mailed to key men periodically—the subjects to be an exchange of information obtained in the field and answers to current problems.

The company will submit a campaign prospectus on request.

•

Compressor-Generator

Schramm, Inc., West Chester, Pa., offers the Model 60 Fordair compressor with 5-kw. single-phase 60-cycle 120-volt a.c. generator, said to be a compact source of compressed air and electric current arranged for location under a work bench in a portable machine shop—either truck, trailer or railway car. The unit will produce 60 cu.ft. of compressed air at 100 lb. gage pressure or 5 kw. of single-phase a.c. at 120 volts, or simultaneously compressed



air and electric current to the extent of the engine horsepower. The Schramm safety vacuum control is said to limit the supply of air compressed when an electric load is being carried.

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Conveyor-Elevator

Chain Belt Co., Milwaukee, Wis., offers a new conveyor-elevator system, the Rex Uni-Flo, for the mass handling of free-flowing bulk materials. This is a conveying unit of the continuous-stream type composed of the chain-belt equipped closely spaced scraper-carrier flight which operates in an inclosed casing. With the entire cross-section of the casing and all the space between the flights solidly filled with the material being handled, a continuous flow of material results.

Rex Uni-Flo has a discharge mechanism which, it is said, definitely removes all material in the conveyor system at the point of discharge; is completely self-feeding and no auxiliary feeding devices are required. Self-cleaning, it has a minimum of churning and degradation of materials either while in operation or after the feeding has stopped. It operates at relatively slow speeds. It can convey materials horizontally, vertically or at any angle.

Bulletin 442, giving capacity tables, horsepower formulas, general arrangements and dimensions, is available on request.

•

Etcher-Demagnetizer

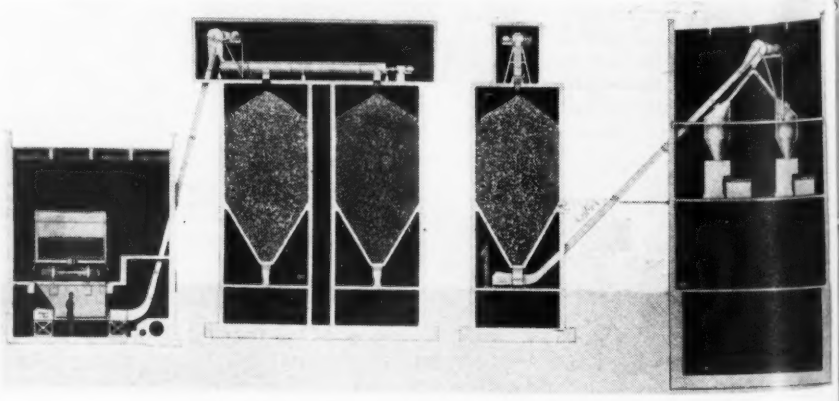
Ideal Commutator Dresser Co., 1913 Park Ave., Sycamore, Ill., offers a new tool ready for instant use either as an etcher or demagnetizer. To etch small tools and parts, simply place them on the work plate, turn switch "on" to proper heat and start etching. A ground clamp is provided for etching parts too large for the work plate. Fourteen heats are provided by "Hi-Lo" tap and 7-point switch, giving a wide range for marking all iron, steel and their alloys from small delicate parts up to large smooth castings.

To demagnetize, it is only necessary to turn the switch "on" to either No. 1 or No. 2 position and proceed as with ordinary demagnetizer.

•

Cutting Tools

Jessop Steel Co., Washington, Pa., offers Malta carbide-tipped tools, a line of cemented carbides for cutting steel, cast-iron, non-ferrous and non-metallic materials. These tools are manufactured in ten different styles in a wide range of sizes and three grades of tips: MF for miscellaneous finishing, SF for steel finishing and CR for coarse roughing. The grades are distinguished by colored shank ends: MF—red, SF—white and CR—blue, to



60,000 LESS MEN! 37,000,000 MORE TONS OF COAL

Like this approved modern armored unit—approved WHEAT Electric Cap Lamps are more durable and modern in design—designed to increase coal production with increased safety.

GET BEHIND THE MEN BEHIND THE LAMPS

This is the goal, if victory is to be won—if the home front is to back the attack. It can be done, and KOEHLER Flame Safety Lamps and WHEAT Approved Cap Lamps can help you to meet these phenomenal production figures.

High coal production depends to a great degree on SAFETY—reduced fatalities per ton of coal mined.

Brighter, steadier light of WHEAT Approved Cap Lamps is a safety factor of major importance. Even as our mechanized army needs modern protective equipment, so do our mechanized mines need these two essential safety products, which have been protecting miners for over 30 years.

It will repay executives, interested in cost reduction and increased coal production, to give WHEAT safety lighting costs close study. ***Write us today!***

Write today—

WHEAT LAMP SALES, INC.

1501 Kanawha Valley Bldg., Charleston, W. Va.

SPECIALISTS IN MINE LIGHTING FOR 30 YEARS

KOEHLER MFG. CO.

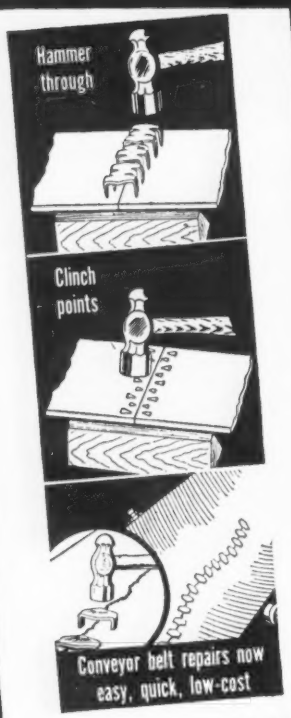
Marlboro, Mass.

KOEHLER SAFETY LAMP

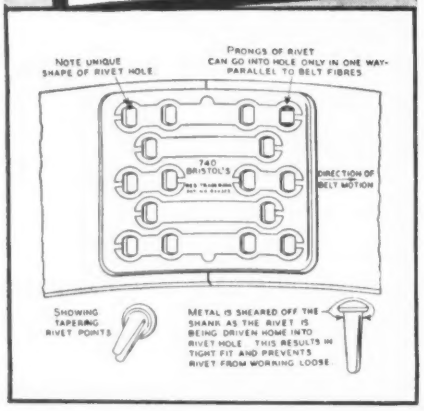
RUGGED · DEPENDABLE SENSITIVE

BELTS STAY JOINED

because staggered points prevent single-line strain



With Bristol's Staggered Point Lacing on your belts — any kind — you get double security . . . because staggered points enter in a double row. You also get application ease that can't be beat . . . as simple as hammering nails. In fact all the equipment you need is a hammer and a block of wood. Just the thing in an emergency. Write for Bulletin 728A.


NOTE UNIQUE SHAPE OF RIVET HOLE
PRONGS OF RIVET CAN GO INTO HOLE ONLY IN ONE WAY—PARALLEL TO BELT FIBRES
740 BRISTOL'S
DIRECTION OF BELT MOTION
SHOWING TAPERING RIVET POINTS
METAL IS SHEARED OFF THE SHANK AS THE RIVET IS BEING DRIVEN HOME INTO RIVET HOLE. THIS RESULTS IN TIGHT FIT AND PREVENTS RIVET FROM WORKING LOOSE

Also available are Bristol's Steel Belt Plates with matching rivets for conveyer, elevator and transmission belting. Also easily applied with a hammer. A wide assortment for all shapes of pulleys. Bulletin 729 gives specifications.

THE BRISTOL COMPANY
139 Bristol Road, Waterbury 91, Conn.

insure proper grade selection. The tools are rustproofed to permit long storage safely.

•

Soldering Torch

Selected primarily for use in its own shop for connecting electrical windings, an internally gas-fired soldering torch, operating on an air-pressure line, has proved so satisfactory that it is being offered to others by National Electric Coil Co., with plants at Columbus, Ohio, and Bluefield, W. Va., states the manufacturer.

The torch heats to working temperature in 60 seconds and to red heat in 4 minutes. Simple, instantaneous regulation

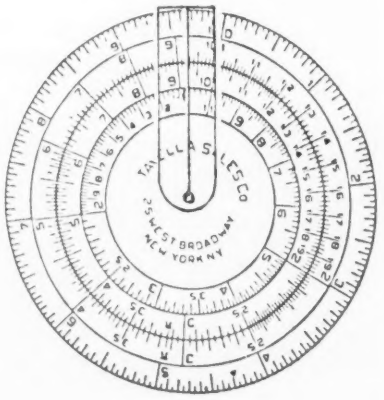
holds heat steady at the selected temperature. It is light in weight, will burn in any position and cannot be extinguished by fumes or submersion, the company states.

There are two styles, one operating on natural gas and the other on gasoline or artificial gas. A gasoline vaporizer unit is available to supply fuel to the artificial-gas torch for use where piped gas is not available. An air line pressure of at least 20 lb. per square inch is necessary. Descriptive bulletin available.

•

Circular Slide Rule

Tavella Sales Co., 27 West Broadway, New York 7, N. Y., offers the Monitor slide rule, specially adapted for carrying in the brief case, being small in size, light in weight and accurate. An improved process of graduating black lines on white vinylite, says the maker, permits making a slide rule that is accurate and will retain that accuracy indefinitely. It is grease- and



YOU CAN ELIMINATE STOKER DAMAGE

by

TRAMP IRON

with

Stearns

MAGNETIC PULLEYS

Air cooled, because of their ventilated design and will provide a powerful, positive, automatic and economical means of diverting tramp iron from your product. Made in a wide variety of sizes to fit your conveying system or in self contained units, all sizes, for moving from place to place. Ask for Bulletin 302.

For some applications, an automatic spout type magnet may better suit your needs. Being satisfactorily used in many outstanding coal conveying systems. Get our Bulletin 97X.

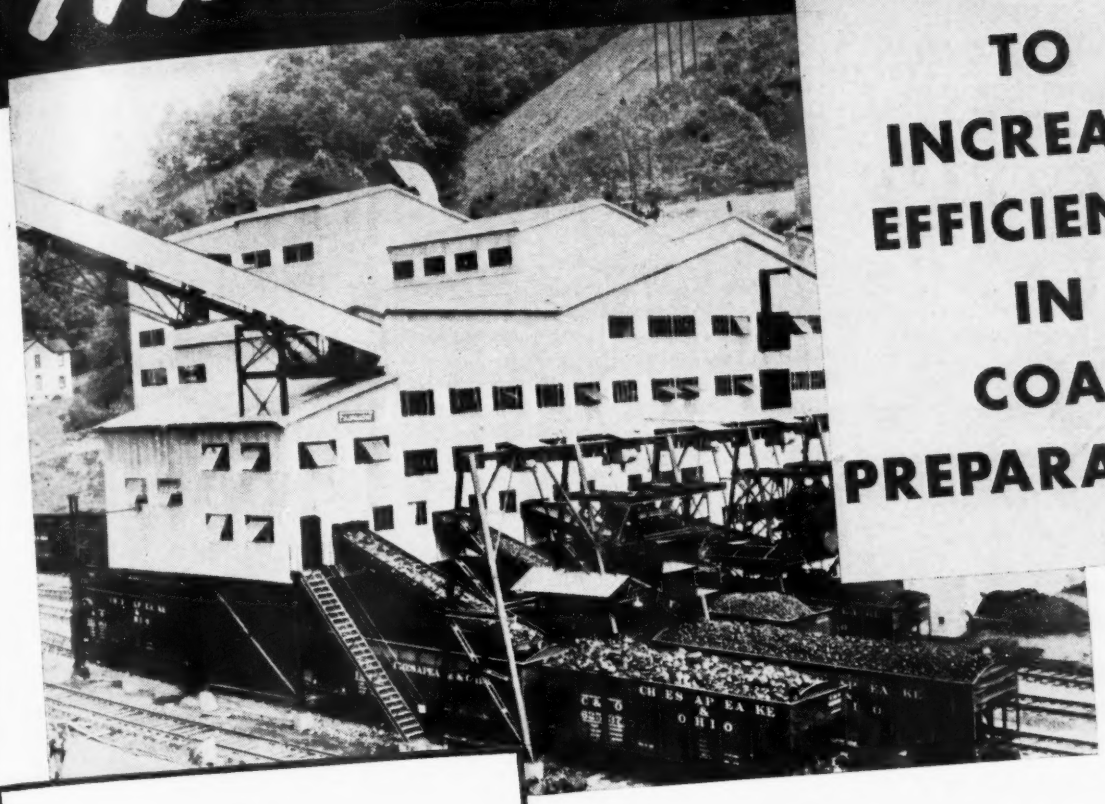
Stearns Engineers are well qualified to advise you. Ask for our recommendations. No obligation.

STEARNS MAGNETIC MANUFACTURING CO.
661 S. 28th St., Milwaukee, Wis.

STEARNS—MAGNETIC
MILWAUKEE

Modern Methods*

TO INCREASE EFFICIENCY IN COAL PREPARATION



*

Install mechanical cleaning methods wherever possible, to meet specific size demands.

Consider size simplification to meet heavier demand loads on any one size.

Improve crushing practices and equipment.

Extend preparation to include reclamation, cleaning and drying of slurry and other fine sizes.

Extend drying and methods of same so as to eliminate excessive load on transportation facilities.

Maintain closer control over finished product.

Install automatic control equipment wherever possible.

• Boost production *and* quality with correct methods of coal preparation. Check with FAIRMONT today as to the preparation method best suited to your operations. Regardless of where your particular problem is . . . from mine feed to railroad car . . . FAIRMONT has the experience and facilities to design, engineer and equip, so as to obtain maximum benefits for you.

Call in FAIRMONT Engineers for help in designing your new preparation plant, or if you are planning on rejuvenating your present preparation plant FAIRMONT will help you redesign to produce more and better coal.

TRADE MARK REGISTERED

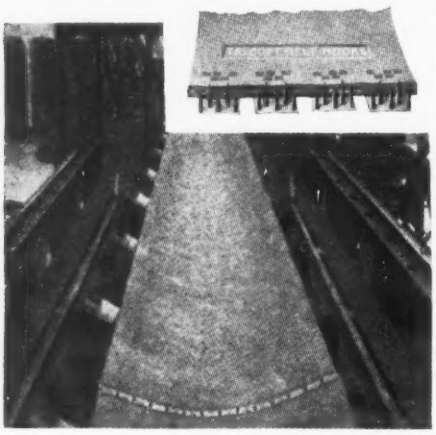
FAIRMONT MACHINERY COMPANY

FAIRMONT, W. VA.

CONVEYER BELTS

Keep 'em running with

TALCOTT FASTENERS



STRONG – ECONOMICAL

NEED NO SPECIAL TOOLS!

• If you want a permanently TIGHT pliable joint—a joint that conforms to the troughing idler pulleys—a joint that eliminates catching or tearing by scrapers—a joint that KEEPS YOUR BELT in PRODUCTION—the answer is this special TALCOTT. It's easily, quickly driven into the top or load side. Won't crack or break under trippers or on tandem drives. Made of the best malleable iron—*saves* thousands of dollars and hours of production time—one of the *strongest, quickest*-applied, *low cost* fasteners on the market . . . TALCOTT!

This is just one of the many TALCOTT FASTENERS for joining and patching Conveyor and Transmission Belting. For complete details, write for circulars.

• *Sent on request.*

Trial orders. Try them—then YOU'LL do as so many other belt users do—STANDARDIZE ON TALCOTT!

W. O. & M. W.
TALCOTT INC.
PROVIDENCE, R. I.

waterproof and should the instrument become soiled it can easily be cleaned by washing with soap and water.

The scales are on a disk 6 in. in diameter; length of multiplication, division scale, 13.8 in., as against 10 in. of the regular 10-in. slide rule. Multiplication, division, square root and problems involving the use of logarithms and functions of angles are quickly solved with the Monitor rule. The front side has four scales: log, C. D. and C inverted scale. The reverse side has sine and tangent scales and A and D scale for finding squares and square roots.

•

Varnishes

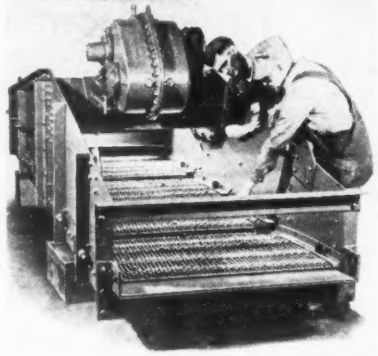
Sterling Varnish Co., 182 Ohio River Boulevard, Haysville, Pa., offers "Speedairbonds," a group of air-drying, insulating varnishes designed for use in the manufacture and repair of electrical equipment. They are said to dry exceptionally fast to a smooth, glossy finish; to be oilproof and extremely water-, acid- and alkali-resistant, and possess high dielectric qualities. Bulletin 243, entitled "Sterling Speedairbonds," contains descriptions of these varnishes and various Sterling specialty products, such as stripping compound, balancing compound, rust preventives, commutator plants, identifiers, etc.; copy on request.

•

End-Tension Deck

A new tensioning principle is employed in the design of the end-tension deck now made available by Allis-Chalmers Mfg. Co., Milwaukee, Wis., on Low-Head, Aero-Vibe and Ripl-Flo vibrating screens. The deck can be used for wet and dry screening, washing and dewatering processes.

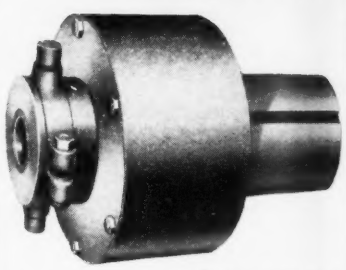
The desirability of maintaining an even bed depth in screening processes for the coal, ore rock, chemical and food industries led the manufacturer to design a deck



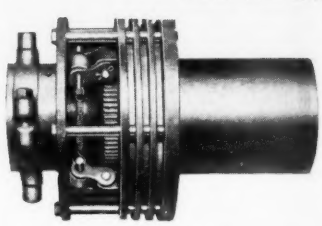
which eliminates transverse arching of the screen surface, as with transverse single and double crowned decks. By employing a series of longitudinally tensioned, transversely flat screen surfaces the end-tension deck inherently maintains even depth of material.

The screen is tensioned by clamp bars at the ends of the screen and by intermediate adjustable bars when more than

KINNEY DRY PLATE DISC CLUTCH



Clutch with Cover



Clutch with Cover Removed
Note Rugged, Compact Design

This Kinney Clutch of high-speed type is giving efficient service in many fields where it is employed on hoists and other equipment as a drive clutch, auxiliary clutch and in connection with power take-off mechanisms. Compact and strong, it gives easy pickup of load without vibration or strain and can operate at unusually high speeds. Friction surfaces are sintered bronze, running against steel discs and normally operate dry. Furnished in single or duplex construction with capacity from 1 to 30 H.P. per 100 R.P.M. Duplex units can be used to obtain forward and reverse movements, high and low speeds, or one unit can serve as a clutch and the other as a brake.

There's a KINNEY Clutch for almost every application. Write for further information.

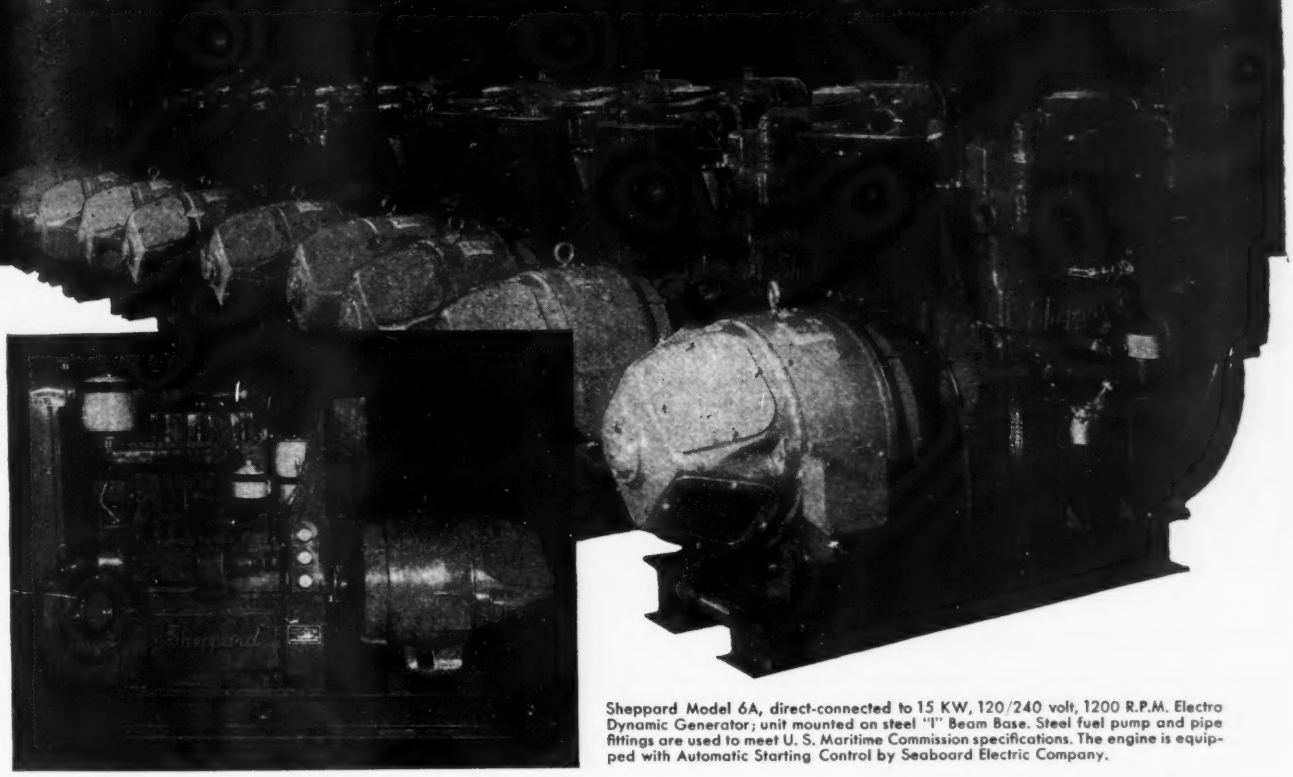
KINNEY MANUFACTURING CO.

3525 Washington Street
Boston 30, Mass.

NEW YORK CHICAGO LOS ANGELES
PHILADELPHIA SAN FRANCISCO

"1-A" IN THE MERCHANT MARINE . . . AND "A-1" FOR GENERAL SERVICE

Sheppard Diesels Meet Exacting U. S. Maritime Commission Specifications



Sheppard Model 6A, direct-connected to 15 KW, 120/240 volt, 1200 R.P.M. Electro Dynamic Generator; unit mounted on steel "I" Beam Base. Steel fuel pump and pipe fittings are used to meet U. S. Maritime Commission specifications. The engine is equipped with Automatic Starting Control by Seaboard Electric Company.

TO be fit for service—"1-A"—in the merchant marine, this model 6A Sheppard Diesel had to measure up to the tough specifications of the U. S. Maritime Commission—for example, 25% overload for 2 hours. It had to be as good as it is to make the grade with the Commission . . . and with Ingalls Shipbuilding Corporation.

Ingalls uses these dependable, compact Sheppard 6A's as generators because they can handle any and all types of auxiliary generating jobs on any and all types of vessels. But these 6A's also give "A-1" service in refinery, quarry, mine, factory and general installations.

There's a reason for Sheppard versatility. To begin with, the Sheppard 6A packs a lot of power into a minimum of space. It's reliable, too—you can depend on it to deliver 25 H.P. at 1200 R.P.M. under any operating conditions. What's more, the fuel injection system is simplified to stay out of trouble. And, like every Sheppard Diesel, it comes ready to install without makeshift additions . . . in new equipment . . . in converted units.

If you want the most efficient, most economical power you can buy . . . and that's Diesel power . . . get ready to shift to Sheppard Diesels!

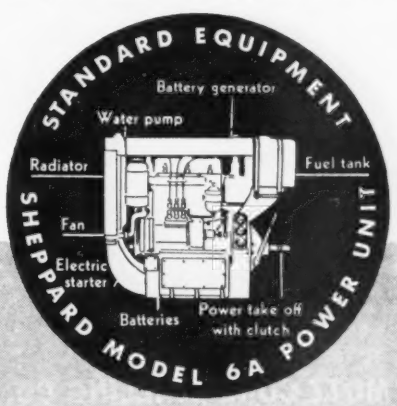
☆ ☆ ☆

Sheppard works for V-Day in two ways. We devote most of our production to speeding its arrival. We devote much of our thinking to meet the future with its enormously expanded demand for efficient, economical Diesel power. Sheppard engineers are prepared to help you plan ahead. Write for information and illustrated data sheet on the Sheppard Model 6A today.

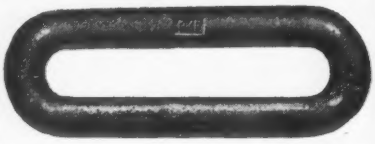
R. H. SHEPPARD COMPANY, HANOVER, PA.

Sheppard

ALL AMERICAN DIESELS



FOR SAFETY'S SAKE, SUPERIOR COUPLINGS



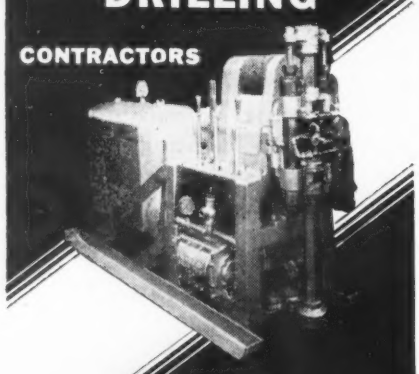
Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH
KNIFE & FORGE CO.
716 Chateau Street
N. S., Pittsburgh, Pa.

MOTT
DIAMOND CORE DRILLING
CONTRACTORS



Mott Type "A" Oil Hydraulic 1500 Ft. Cap., 2¾" Diameter Core.

● Coal and all mineral properties tested—using our light gasoline drills. They save fuel and moving costs . . . guarantee satisfactory and proper cores.

Pre-pressure grouting for mine shafts . . . ground solidification for wet mine areas by our stop grout method. Water wells and discharge holes drilled and grouted . . . electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

two screen sections are used. A distributing plate at the feed end of the screen distributes material uniformly over the entire width of the screen to reduce surface wear.

Sections of the deck may be turned end for end and upside down for longer screen life. Transverse supporting bars on the underside of the deck are covered with molded rubber strips, and act as individual drip strips to assist in more efficient draining of the material in washing and dewatering processes. The feed end of each section can be furnished with a blank surface designed to obtain a pool-washing effect for scrubbing and scouring the material. Further information may be obtained in Bulletin B-6321.

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Industrial Notes

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has named William D. Turnbull, who has been vice president and sales manager, Pomona Pump Co. of California, as manager of the Westinghouse agency and specialties department. Before joining the Pomona company, in 1940, he was manager of the Westinghouse machinery electrification section.

Jewell Belt Hook Co., Naugatuck, Conn., has elected Charles L. Tolles as president and George E. Bean as secretary and treasurer. W. D. Calvert has been named cashier and D. C. MacVicar as sales manager. Charles L. Tolles, who also is president of the Hartford Belting Co.; George E. Bean, L. A. Dibble, Emil Mannweiler and E. M. Beecher have been elected directors.

Warren Pump Co., Inc., Warren, Mass., has received notification that a star is to be added to its Army-Navy "E" pennant.

Vulcan Iron Works, Wilkes-Barre, Pa., has appointed Ralph O. Smith as general sales manager. Formerly in charge of mining machinery sales, he has been with the company since 1918. He is the son of the late F. O. Smith, former vice president; and grandson of the late Frederick G. Smith, treasurer of the company for many years.

Storage Battery Division, Philco Corp., Trenton, N. J., has received its fourth Army-Navy "E" award.

Harnischfeger Corp., Milwaukee, Wis., has established a new repair sales division, managed by J. D. Glatz, recently returned from Washington after two years with WPB as chief of the crane and hoist section in the tools division. Prior to that he was representative for P. & H. products in the Chicago area.

American Car & Foundry Co., New York City, has appointed William R. Kottsieper as manager of its valve department. Associated with the company 38 years, his first job was in the St. Louis office, where he went to work in the auditing department. When the company moved to New York, in 1918, he was transferred to the operating department. In 1931, when A.C.F. decided to go into the production

QUALITY MARLO PACKING

METALLIC & SEMI-METALLIC
PACKING
for
MINE PUMPS

"The Packing that gets the Repeat Orders"

For deep mine pumps. Resists acid mine waters. Keeps grit out of stuffing box. Three types.

• MARLO ALL PURPOSE
METALLIC PACKING

Best ever devised. Will not freeze at 70° below. Soft, pliant, like fibrous types, yet easier to handle. Won't cut, score or corrode moving parts.

• "TWIN-TWIST"
SEMI-METALLIC PACKING

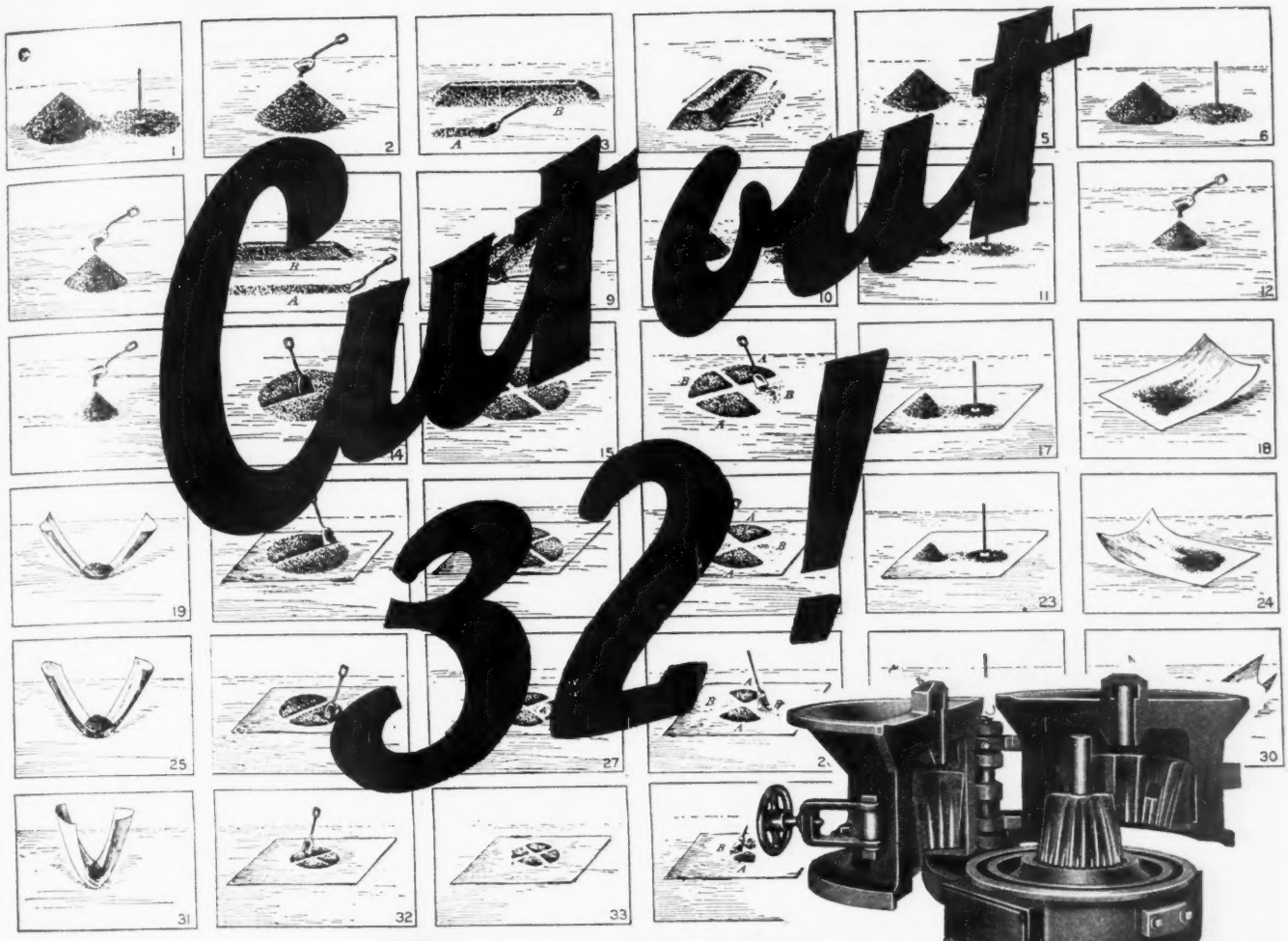
Metal strands twisted with asbestos. Anti-frictional. Durable. Economical. Remarkable compressability. Never hardens. For temperature up to 550° F.

• "RED WATER"
SEMI-METALLIC PACKING

Most modern development for all hydraulic applications. A solid-packing vegetable fibre combined with metal strands. Retains form under any conditions.

Let us serve you!

THE MARLO COMPANY
38 HOWARD ST.
NEW YORK, N. Y., U. S. A.



Eliminates 32 operations—
Do a day's work in minutes!

USE THE

Sturtevant

AUTOMATIC
COAL CRUSHER
AND SAMPLER

Your coal operators need no sales talk on today's vital importance of PROPERLY SAMPLED COAL to produce a properly blended and graded QUALITY product. Even with the manpower shortage you can get such samples—and save time, too. With the Improved Sturtevant Automatic equipment you can crush and sample 1000 lbs. in a FEW MINUTES, eliminating all inaccuracy due to the human element, and getting a far superior product for shipment to the Laboratory.

Interested? Then write for Bulletin 85—"How to Sample Coal Automatically". Contains complete details, sectional views, and actual comments from Engineers as to results. Send for your copy TODAY.

- GREATER ACCURACY!
- MORE SPEED!
- NO MOISTURE LOSS!
- INCREASED SALES!

STURTEVANT MILL CO. HARRISON SQUARE BOSTON, MASS.

of valves on its own, Mr. Kottsieper assisted in organizing the valve department and was made assistant manager of sales.

JENKINS BROS., Bridgeport, Conn., raised two flags March 4 each bearing an additional star. They represent the third "M" award by the U. S. Maritime Commission and the fourth "E" award by the Army and Navy.

H. K. PORTER CO., INC., Pittsburgh, Pa., has purchased Mt. Vernon Car Mfg. Co. and its subsidiary, J. P. Devine Mfg. Co., both with plants at Mt. Vernon, Ill. Acquisition of the Mt. Vernon company, representing about 10 percent of the nation's freight-car manufacturing capacity, makes Porter the largest independent in this industry. Devine will add to the Porter line such heavy chemical, food and oil refinery equipment as dryers, fractionating columns, impregnators, vulcanizers, flakers and condensers, besides facilities for manufacturing equipment already produced by Porter.

ELECTRIC SERVICE MFG. CO. became the new name of the Electric Service Supplies Co., Philadelphia, effective March 20. A. H. Englund, executive vice president, has been elected president and J. R. McFarlin, electrical engineer, is now secretary.

INDEPENDENT PNEUMATIC TOOL CO., Chicago, has elected Neil C. Hurley as chairman of the board and Neil C. Hurley, Jr. as president. Edward G. Gustafson, treasurer of the company, and John Mc Guire, secretary, have been elected to the board of directors.

CUTLER-HAMMER, INC., Milwaukee, Wis., has appointed G. E. Hunt as acting manager of the company's Atlanta territory with offices and warehouse at 134 Marietta St., N. W., Atlanta, Ga. He has been with the company since 1920, serving in the New York, Philadelphia, Cleveland and Milwaukee headquarters offices and, most recently, as manager of the Indianapolis office.

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Trade Literature

BELT FASTENINGS—Jewell Belt Hook Co., Naugatuck, Conn. Folder describes malleable iron belt hooks in stock and obtainable on immediate shipment.

INDUSTRIAL RUBBER PRODUCTS—Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. Folder details products for the mining industry including conveyor belts, transmission belts, V-belts, trolley-wire guard, various types of hose, friction material and rubber-lined pipe.

MINE SUPPLIES—Mosebach Electric & Supply Co., 1150 Arlington Ave., Pittsburgh 3, Pa. Catalog 44 describes entire line of mine supplies. One section, devoted to 18 styles of Mescoweld rail bonds, shows why these bonds are designed to meet every bonding requirement. Another section, dealing with Mesco insulator switches, explains how these switches are made in a variety of types to take care of practically any size of trolley wire and feed cable. There also are pages dealing with welding machines and accessories, trolley frogs, wheels, splicers, pole heads and harps, overhead line materials, brass castings and replacement parts, the new Mesco-grip trolley clamp and many other items.

V-BELTS—B. F. Goodrich Co., Akron, Ohio. Folder features information about the recently announced wire grommet type V-belt, the result of research engineering into special power problems. Twin cores of endless steel wire twisted on itself form the grommets, which are kept at a uniform distance from the sides of the belt throughout its length. The grommets are covered with counterbalancing and insulated cord. According to the maker, these belts are built with exceedingly high tensile strength, high resiliency to resist shock and assure but little permanent stretch. This type V-belt is furnished only on special jobs where it has been decided by belting engineers that standard belting cannot be used.

MATERIALS HANDLING—Robins Conveyors, Inc., Passaic, N. J. Bulletin describes and pictures the fabrication, assembling and erection of the products of the company for "material aid in materials handling."

RAIL BONDS—Penn Machine Co., Johnstown, Pa. Catalog 44, describing and illustrating Super-Weld rail bonds for power circuits, covers the company's complete line, together with power bonding data.

MACHINE-TOOL ACCESSORIES — Ideal Commutator Dresser Co., 1290 Park Ave., Sycamore, Ill. Bulletin Form MTC-943 describes a.c. magnetic chuck, triple-duty live centers, etcher-demagnetizer, machine-shop metal etcher, portable demagnetizer, electric tachometer, grinding wheel dresser, balancing ways, variable speed transmission and electric cleaners.

ELECTRICAL CONTROL EQUIPMENT—Trumbull Electric Mfg. Co., Plainville, Conn. Catalog describing inclosed safety switches and industrial breakers, service entrance switches, multi-breaker service and load centers, motor control, open knife switches, solderless connectors and fuse holders, panelboards and inclosed busbar distribution systems also carries wire and motor ampere rating tables.

TRACK AND RAILWAY CAR ACCESSORIES—Pressed Steel Car Co., Inc., Pittsburgh, Pa. Catalogs lists in detail the company's wide line of track and railway car accessories. No. 72-K covers running gear, bearing boxes, car parts and trucks. No. 72-L describes track and track accessories, including rails, steel ties, track bolts and spikes, track joints, switches, turntables and miscellaneous track tools.

PROFESSIONAL SERVICES

Consulting **Specialists** **Plant Design**
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ALLEN & GARCIA CO.
ENGINEERS AND BUILDERS OF MODERN COAL OPERATION
Authoritative Valuations and Reports of Mining Properties, Equipment and Operation.
332 S. Michigan Ave., Chicago
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COAL PREPARATION
To Yield Maximum Net Returns
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30 Years
Continuous Consulting Service to Coal Mines
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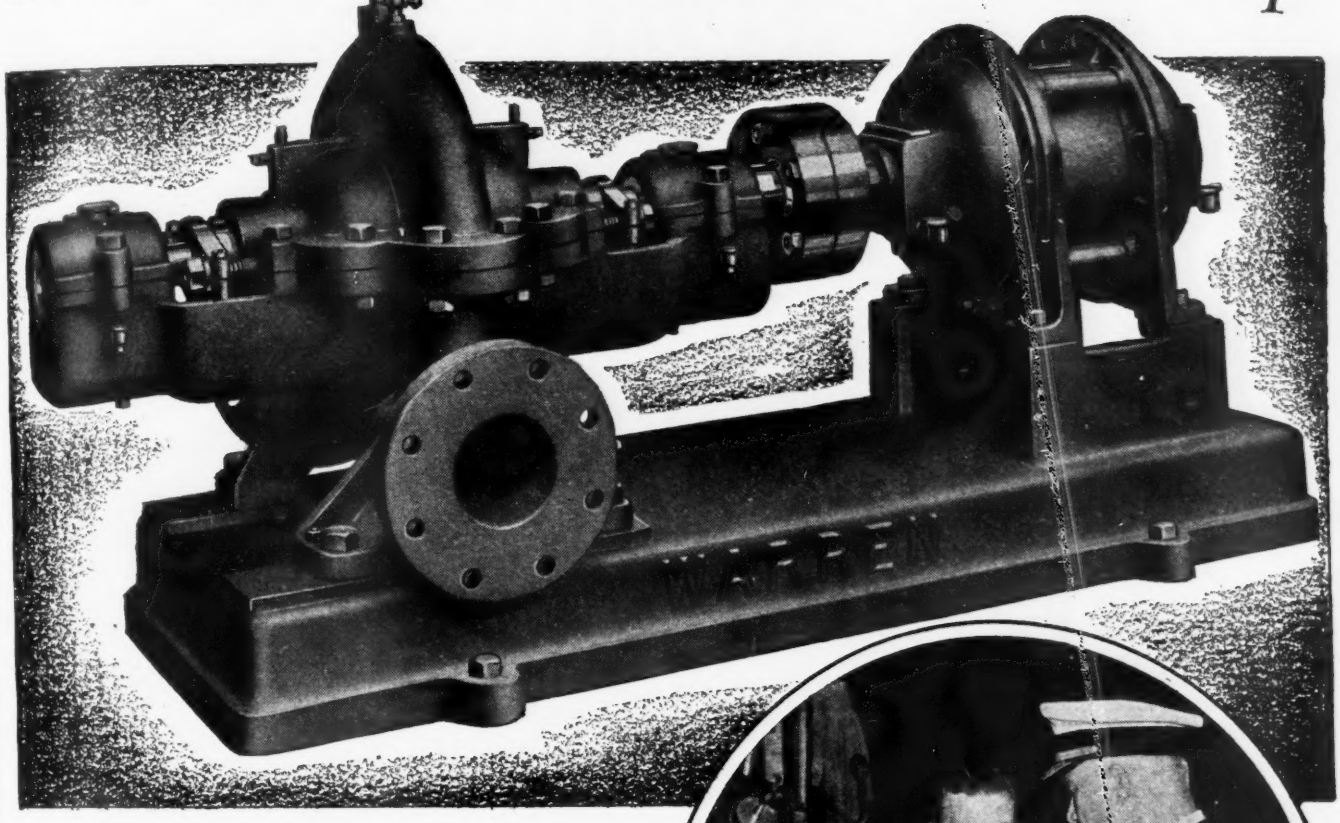
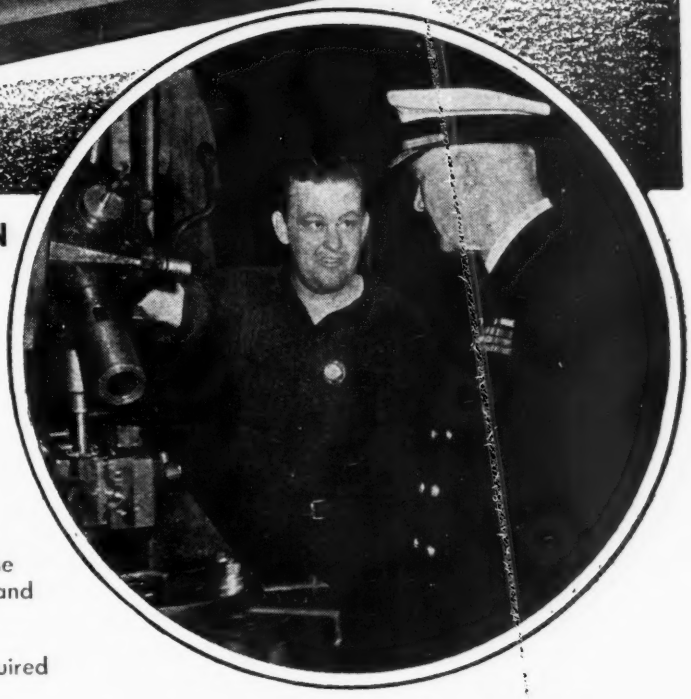
whose cards appear on this page with the confidence justified by the offering of these special services nationally.

POST-WAR PLANNERS—

. . . Here Are Other Warren Pumps That are Headed For The Top





WARREN SINGLE STAGE • DOUBLE SUCTION

CENTRIFUGAL PUMPS

TYPES DB AND DS

As an initial insight into the character of these Centrifugal Pumps, here are a few of their specifications:

Casing: — Close-grained, high test cast iron of the double suction, volute type divided on the horizontal center-line.

Impeller: — Gun bronze composition and of the double suction, enclosed type, accurately machined and balanced to insure freedom from vibration.

Shaft: — Ample diameter to safely transmit required power without undue bending and twisting.

Shaft sleeves, case rings, bearings, stuffing boxes, packing glands and all other features of design and construction are all completely in line with Warren's policy of "No Compromise on Quality". Write for further information or bulletins regarding these Warren Centrifugal Pumps.

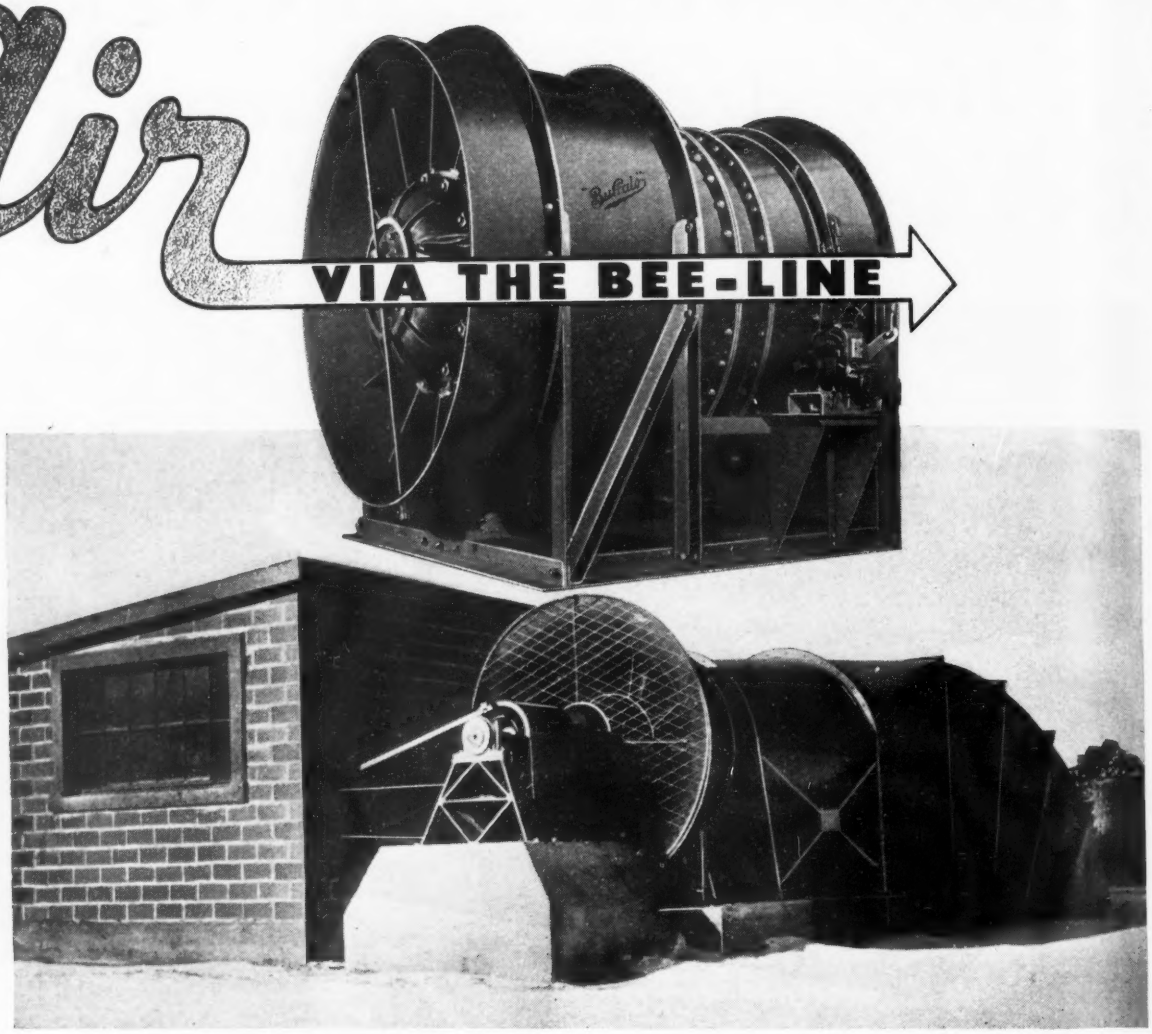
A Warren employee talks with an admiral about the Warren "E" Award. All Warren employees take great pride in the Warren Tradition for reliable, economical performance in peace times . . . and Warren's "service to the end" Tradition in war times.

ARMY E NAVY

WARREN STEAM PUMP CO., INC.

WARREN, MASSACHUSETTS

air VIA THE BEE-LINE



for *SAFE* Mine Ventilation

"Buffalo" AXIALS provide the surety which mine operators look for in ventilation as well as dust and gas control. Built for continuous, unfailing operation, Buffalo Axial Flow Fans are high capacity units which supply the volumes of ventilating air required throughout every section of the mine. These fans can, if necessary, also be used as booster units below ground. The compact design of these Buffalo-developed fans reduce the cost of steel air duct work as well as reducing the size and expense of exterior fan buildings. Because of lightness of weight, a Buffalo Axial Flow Fan is ideally adaptable to canvass duct systems where portability is a necessary feature. Delivering air with a true axial flow—without turbulence and wasted energy—Buffalo Axials are marked by their efficiency and power economy. Engineering details are available in Bulletin 3229-B—yours for the asking. Write

ARMY E NAVY

BUFFALO FORGE COMPANY
147 Mortimer St. Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

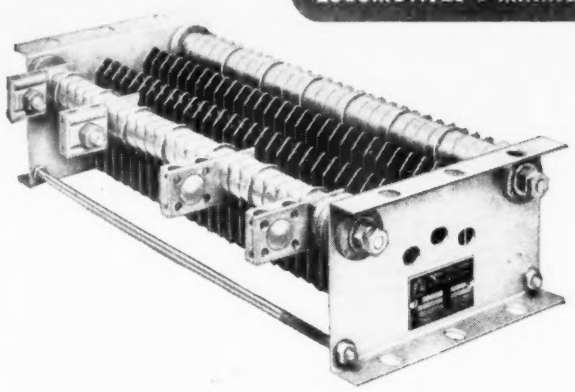
"Buffalo" **AXIAL FLOW FANS**

PROTECTS EQUIPMENT ★ PROMOTES SAFETY ★

P-G

in COAL MINES

LOCOMOTIVES • MINING MACHINES • LOADERS • CONVEYORS

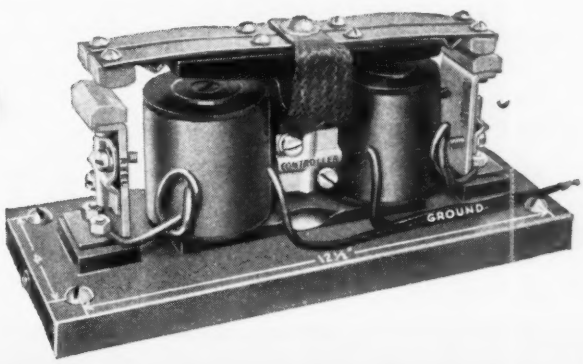


P-G *Steel Grid Resistor*

Steel and Mica, the two basic materials used in construction of P-G Steel Grid Resistors, are the foundation for longer resistor life. P-G uses these materials, in a unique design that provides both for expansion and for maximum ventilation.

P-G *Automatic* TRANSFER SWITCH

Eliminates hand switches—entirely automatic. No shocks or burns to operator while changing from trolley to reel or vice versa. Simple, safe, efficient, easy to install, can be mounted anywhere. For 250 or 550-volt service in single or double trolley and reel. Complete with cover.

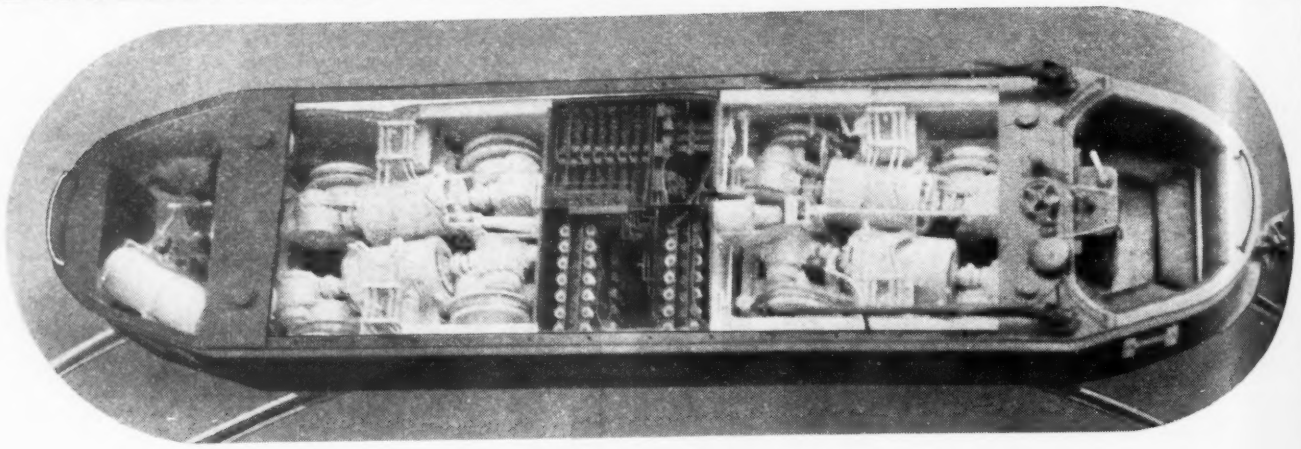


THE POST-GLOVER ELECTRIC COMPANY

• ESTABLISHED 1892 •

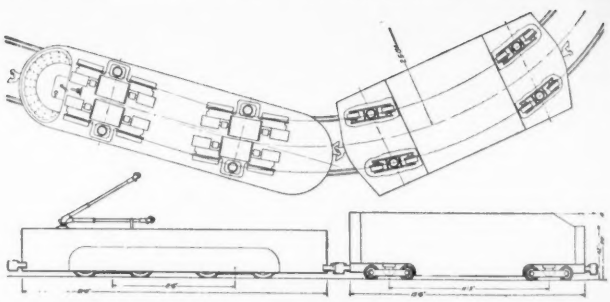
221 WEST THIRD STREET, CINCINNATI 2, OHIO

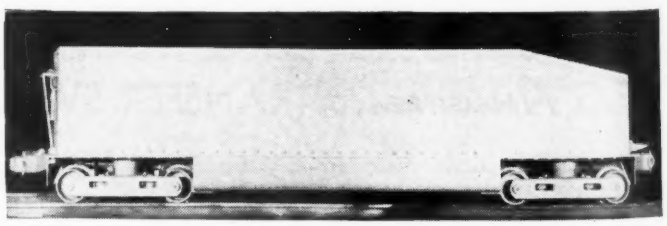
DIFFERENTIAL 8 WHEEL AXLESS LOCOMOTIVE



Plan view shows 21 ton Differential AXLESS Locomotive on a 25-foot radius curve—notice compact design and accessibility for easy maintenance

Differential 360 HP 8-Wheel AXLESS Locomotive has much more adhesion available for tractive effort and braking due to tandem drive correcting for transfer of weight. In addition there is no connection between the wheels on one rail and the wheels on the other rail. Therefore, when negotiating a curve there is no slippage due to difference in wheel travel. By eliminating this slippage, the adhesion between rail and wheel is not broken and there is no loss of drawbar pull. This modern locomotive with AXLESS trucks provides great traction—power on all eight wheels—smooth riding — which enables it to haul heavy loads at high speeds in safety. Full anti-friction bearings and gears operate in a bath of oil sealed away from dirt.





Differential 8 Wheel AXLESS Mine Cars provide greater carrying capacity within a limited height—Requires fewer cars and less maintenance. Smooth riding reduces spillage on haulage ways and assures safety at higher speeds. Less cost per ton—more tons per shift.

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO, U. S. A.

Builders of Haulage Equipment Since 1915

AIR DUMP CARS · MINE CARS · MINE LOCOMOTIVES · ROCK LARRIES · DUMPING DEVICES
BURDEN-BEARING LOCOMOTIVES · STOCKPILING CARS · COMPLETE HAULAGE SYSTEMS

FIRST SOLUTION OF MANPOWER SHORTAGE

Modern Multiplier of Manpower ... WIRE ROPE

Perhaps while in pursuit of food, which scampered under a fallen tree, some primitive man angrily pulled on a vine tangled around the tree and found that he would not need to call for help to move an otherwise impossible load.

In solving the first manpower shortage, this primitive no doubt wondered who pulled as hard on the other end of the vine as he did on his and little realized he had discovered the principle of the pulley.

Today, the pulley has been multiplied into the block-and-tackle and the latter rove with wire rope so strong and tough that mankind goes on hoisting and moving loads which yesterday were considered impossible.

To Union Wire Rope engineers the impossible is a constant challenge. In the finest of wire rope laboratories they work at the one job of making wire rope stronger and tougher to last longer. The tensile strength, torsional values, fatigue life, ductility, hardness of wires, etc. are predetermined. From numerous tests and checks the pedigree of every run of wire rope is recorded and then, wherever possible, its performance on the job is watched. With Union engineers wire rope making is a specialty in which they do not propose to be excelled.

FREE

If You Are Not On Our Mailing List send for these bulletins: "Correct Handling of Wire Rope", "Socketing Wire Rope", "Splicing Wire Rope", "Wire Rope Lubrication", "Rope Dope". Engineering information supplied without obligation.

UNION WIRE ROPE CORPORATION, 2130 Manchester Ave., KANSAS CITY 3, MO.
Tulsa Houston Chicago Salt Lake City New Orleans Monahans, Texas
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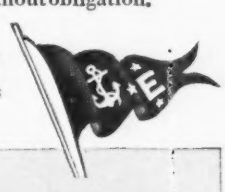
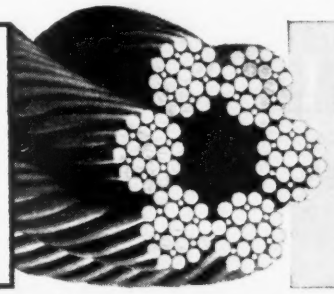
MB-44

For Two Years of Team-work with Our Armed Forces



Tuffy Mining Machine Ropes

union-formed and union-clipped for greater safety and longer service



union Wire Rope

"THE ULTIMATE IN LOW COST WIRE ROPE"

Debris—THE HEADACHE OF COAL PREPARATION

. . . . Is it on the increase in Your plant?

Mechanical loading *under ground* is on the increase. DEBRIS,—rock, slate, sulphur balls, timber ends, mine "hardware," blasting wire, etc.,—is not hand-gobbed at the face. It must be removed from ROM in preparation for cleaning or shipment.

The Patented "PENNSYLVANIA" BRADFORD BREAKER & CLEANER will minimize this *headache* in your coal preparation.

The "PENNSYLVANIA" BRADFORD BREAKER & CLEANER

#1—reduces ROM coal 100% to pass desired screen

#2—prepares coal with minimum fines

#3—product is cubical in shape and almost free from slabs

#4—incidentally, while crushing, large mine rock, slate, sulphur balls, mine props and other debris are removed

#5—requires less than one third of a horsepower per ton for operation

#6—a dependable unit which averages under $.001 maintenance cost per ton

A recent installation at the Peabody Mine, Kincaid, Ill. (Allen & Garcia, Engineers) prepares 1400 tons of ROM per hour, to minus 4½", for mechanical cleaning. It is a single, heavy duty, dependable unit, combining crushing, sizing and preliminary cleaning. "Pennsylvanias" are built in capacities 25 to 1500 T.P.H.

Our Engineers are at your service for plant surveys and recommendations. What are your problems?

PENNSYLVANIA CRUSHER COMPANY

1702 Liberty Trust Bldg. Philadelphia

Representatives in Principal Centers

Cable, "Penncrush," Philadelphia
Pittsburgh New York Chicago
Los Angeles Birmingham London

Associated with
FRASER & CHALMERS ENG. WKS., LONDON
Offices throughout the world
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When we leave the WARPATH-

Tomorrow when Victory is ours and we leave the warpath you will be needing new shovels, cranes and draglines for the big jobs that are now being held in abeyance. When that time comes LIMA will be ready to give your excavator and crane requirements undivided attention.

Faster, safer and more efficient LIMA Shovels, Cranes and Draglines will be available through the use of new material, new methods of manufacture and experiences gained from war time service. The many new advantages to be offered by LIMA will help you make more profit through greater output on the big jobs coming up.

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GET OFF TO A GOOD START

A TYPE and SIZE for EVERY JOB

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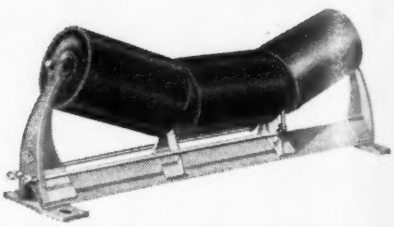
DRAGLINES
CRANES

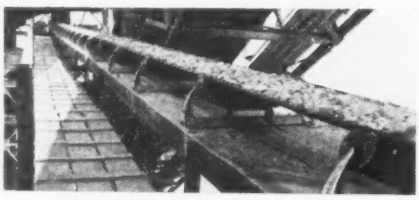
LIMA

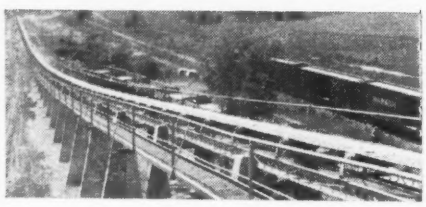
SHOVELS ¾ YD. TO 5 YDS. DRAGLINES - VARIABLE CRANES 13 TONS TO 100 TONS

Continental

BELT CONVEYORS AND ACCESSORIES







Continental Idlers are made in a complete range of sizes and types for any kind of service. Troughing or Return Rolls of either Cast Iron or Steel are made for belts 14" to 60" wide; Troughing Idlers in 5" and 6" diameter sizes; Return Rolls 4", 5" or 6" diameters. All Idlers are equipped with Anti-Friction Bearings.

Consult Continental on your Belt Conveyor problems. We will gladly assist you or make recommendations.

Write for Bulletin ID-105-T.

TRIPPERS PULLEYS TAKE-UPS DRIVES CHUTES
SPOUTS HOLD-BACKS SCRAPERS

INDUSTRIAL DIVISION

CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

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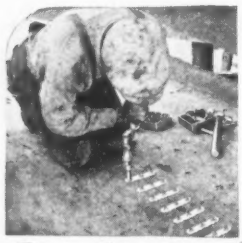
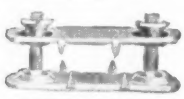


Keep your conveyor belts going with FLEXCO HD BELT FASTENERS

• FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.



• FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

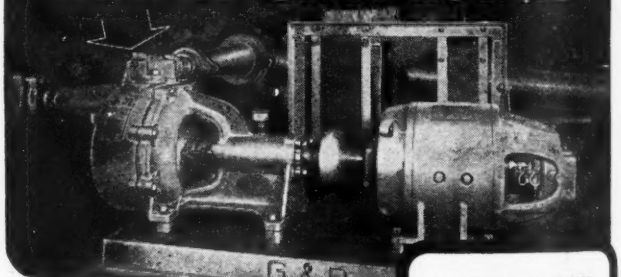
Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy

FLEXIBLE STEEL LACING COMPANY
4638 Lexington St., Chicago

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

it PUMPS 24 hours a day with no "shut downs"



The keynote of the dependable G & R Mine Gathering Pumps is the word "simplicity". Because of greater simplicity (only one moving part — the impeller), these Self-Priming Centrifugals will pump more water, more continuous hours, per dollar invested than any other type. No valves to clog; no cylinder liners to be cut out; no gears, cams, levers, etc., to wear, break, or cause trouble. Pumps operate at motor speed. Capacities up to 220 GPM; heads up to 125 ft. Our engineering department will survey your requirements and make recommendations or write for Bulletin MP-2. It's free.

See our catalog data in Coal Mining Catalogs

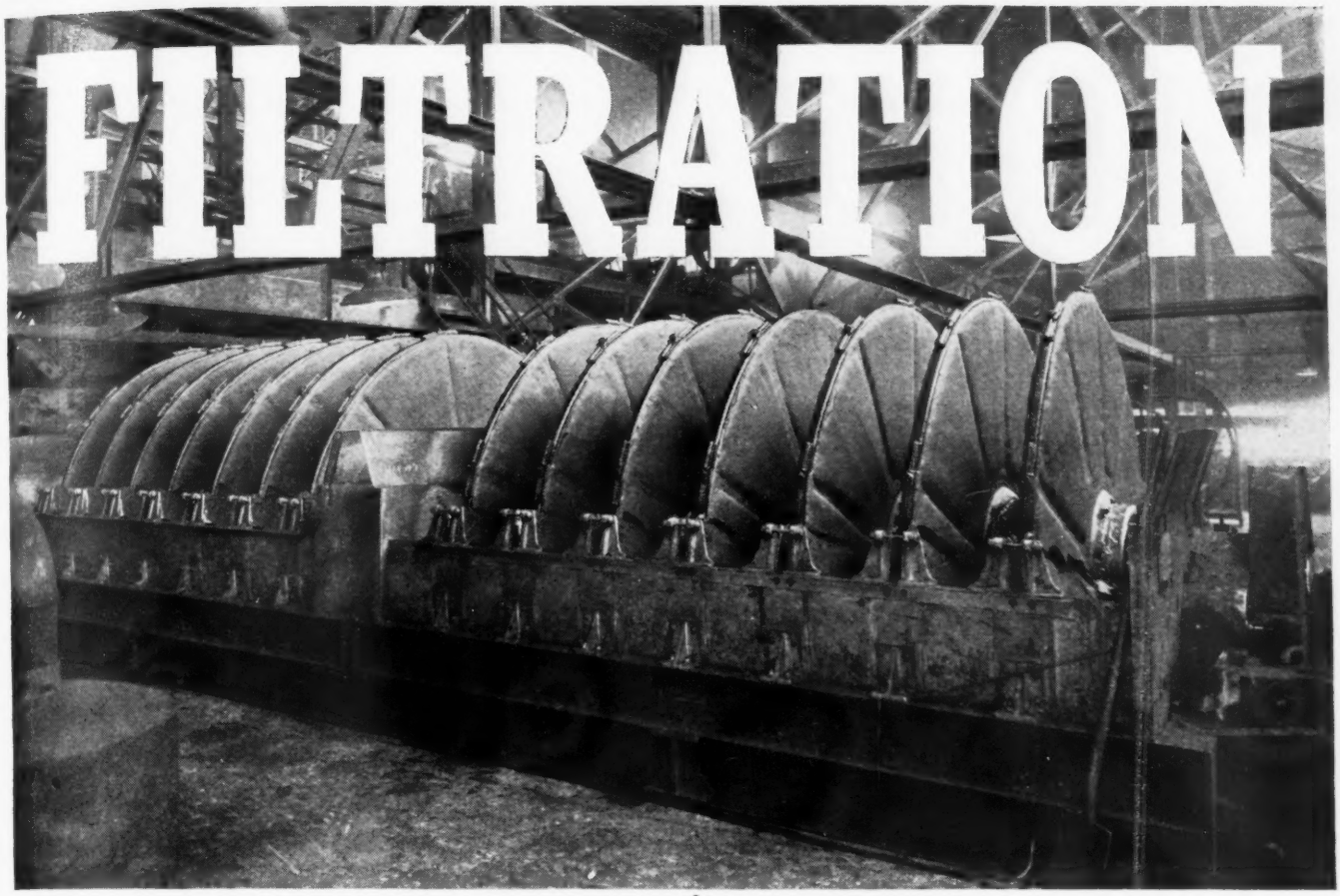
IN WEST VIRGINIA

the Koppers Company are replacing old pumps as they wear out with G & R self-priming centrifugal mine gathering pumps. At the Helen, Stanaford, Kimball, Stotesbury and Kopperstown Mines 36 G & R Pumps of varying capacities are daily proving their simplicity and dependability.

Distributors in all principal Mining Areas.

THE GORMAN-RUPP CO.
MANSFIELD, OHIO

GORMAN-RUPP PUMPS
UNSURPASSED FOR PUMPING FAST



Don't Lose Your Fine Coal

Why go to all the expense of mining, loading, hauling, hoisting, breaking and washing coal only to lose as fines in the wash an appreciable percentage of the tonnage handled up to this point? Particularly when these fines are usually of higher calorific value than the larger coal loaded into the cars?

Our engineers will be glad to discuss the installation and operating phases of the American Continuous Filter which is ideal for recovering these fines.

This filter is installed in a number of collieries as in Nemacolin shown above. Per-ton costs are only a few cents for operating and maintenance. The American Filter soon pays for itself.

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33 West 42nd Street

OLIVER UNITED FILTERS INC.

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Western Sales Division
Oakland 1, Calif.
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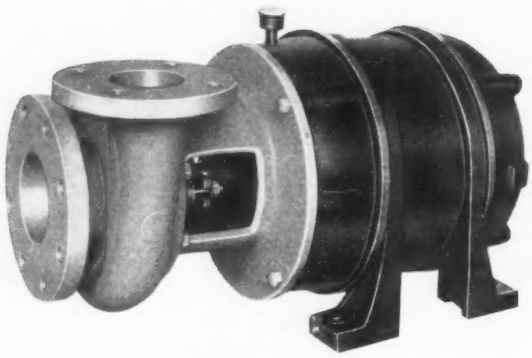
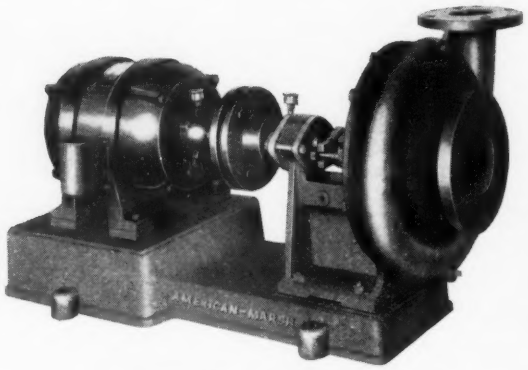
Factories: Oakland, Calif. - Hazleton, Pa. - Orillia, Ont., Canada - Melbourne, Australia

CENTRIFUGAL PUMPS

AMERICAN-MARSH PUMPS *for HIGH Efficiency and LOW Cost*





CLOSE COUPLED

Type RMU.

Extreme compactness because of built-together design—yet no sacrifice in efficiency or sturdiness. Available with electric motor, steam turbine or gasoline engine. Sizes from 5 to 1750 gallons per minute. Ask for Bulletin 400.

DOUBLE BEARING

Type RD.

Single Stage, Single Suction. Designed for high efficiency at low initial cost. Available with any type driver. Especially adaptable to special metal alloys for handling corrosive liquids. Sizes up to 4600 GPM. Ask for Bulletin 300.

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CENTRIFUGAL, TURBINE, STEAM AND POWER PUMPS

AMERICAN-MARSH PUMPS INC.
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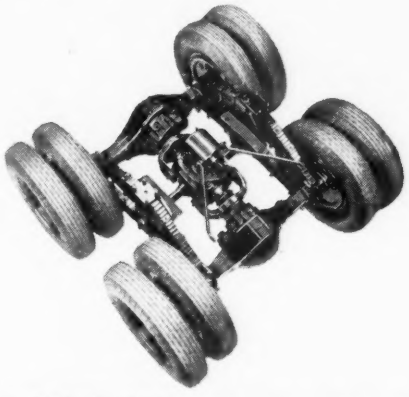
GET YOUR HEAVY DUTY TRUCK THIS SIMPLE WAY

Install a THORNTON FOUR REAR WHEEL DRIVE ON YOUR 1½-2 TON MEDIUM TRUCK

• New heavy duty trucks are very scarce, yet you need one badly to handle your hauling requirements.

Here's How You Get That Truck

Go to your nearest truck dealer and arrange to have a THORNTON Four-Rear-Wheel DRIVE installed. This will convert your new or used 1½-2 ton medium into a six-wheel, heavy duty truck . . . with two driving axles *under* the load . . . capable of hauling 100% more payload, climbing steeper grades, moving loads over bad ground conditions.



This is the THORNTON DRIVE, consisting of two driving axles; two-speed gear case assembly; "walking beam" type springs; wheels; tires.

THORNTON TANDEM CO.

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Investigate **THORNTON** *Automatic-Locking* **DIFFERENTIAL for Replacement in Truck Axles**

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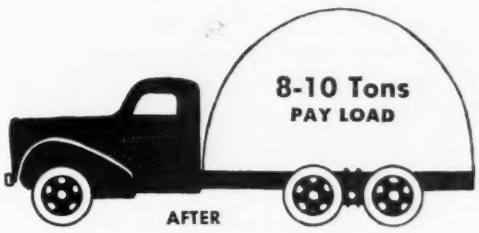
And the cost of your converted heavy duty truck is less than the original cost of a new heavy truck of the same capabilities.



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Address_____

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Make of Truck_____ Year_____

Used for_____

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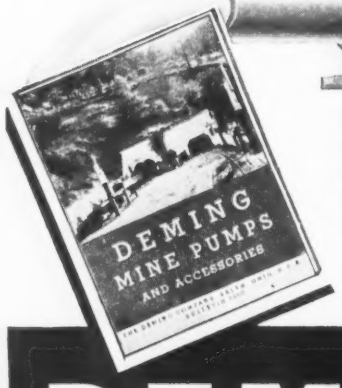
● Modern features of Deming Turbine Pumps assure dependable mine dewatering at low cost. Adjustable semi-enclosed impellers and water lubricated bearings contribute to easy maintenance and long life. Impeller or stuffing box adjustments can be made from surface.

Electrical starting and operating equipment at surface level cannot be flooded out. Pump can be run at night or during off-peak periods. Write for complete information.

THE DEMING COMPANY
SALEM, OHIO



Send for special Bulletin 1000 which contains important data on the complete line of Deming Mine Pumps and Accessories.

DEMING
Mine Pumps

The Cincinnati
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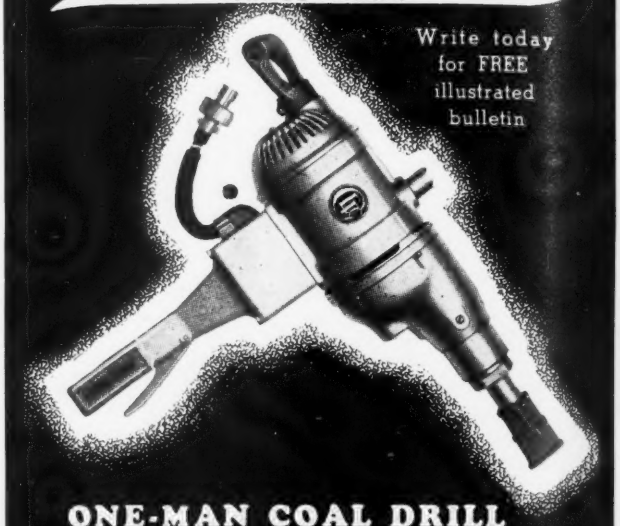

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. . . lowers drilling costs because it is designed and constructed to give more power "pound for pound" and more drilling efficiency "day after day." Used successfully in drilling both anthracite and bituminous coal. Easy to operate. Sold with money-back guarantee. Write today.

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Carbondale **1600**
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PERFORATED PLATE
Round—Square—Diagonal—Slot
Any perforation

HENDRICK MANUFACTURING CO.
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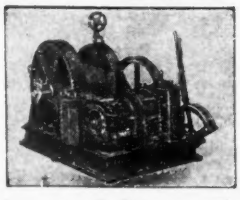
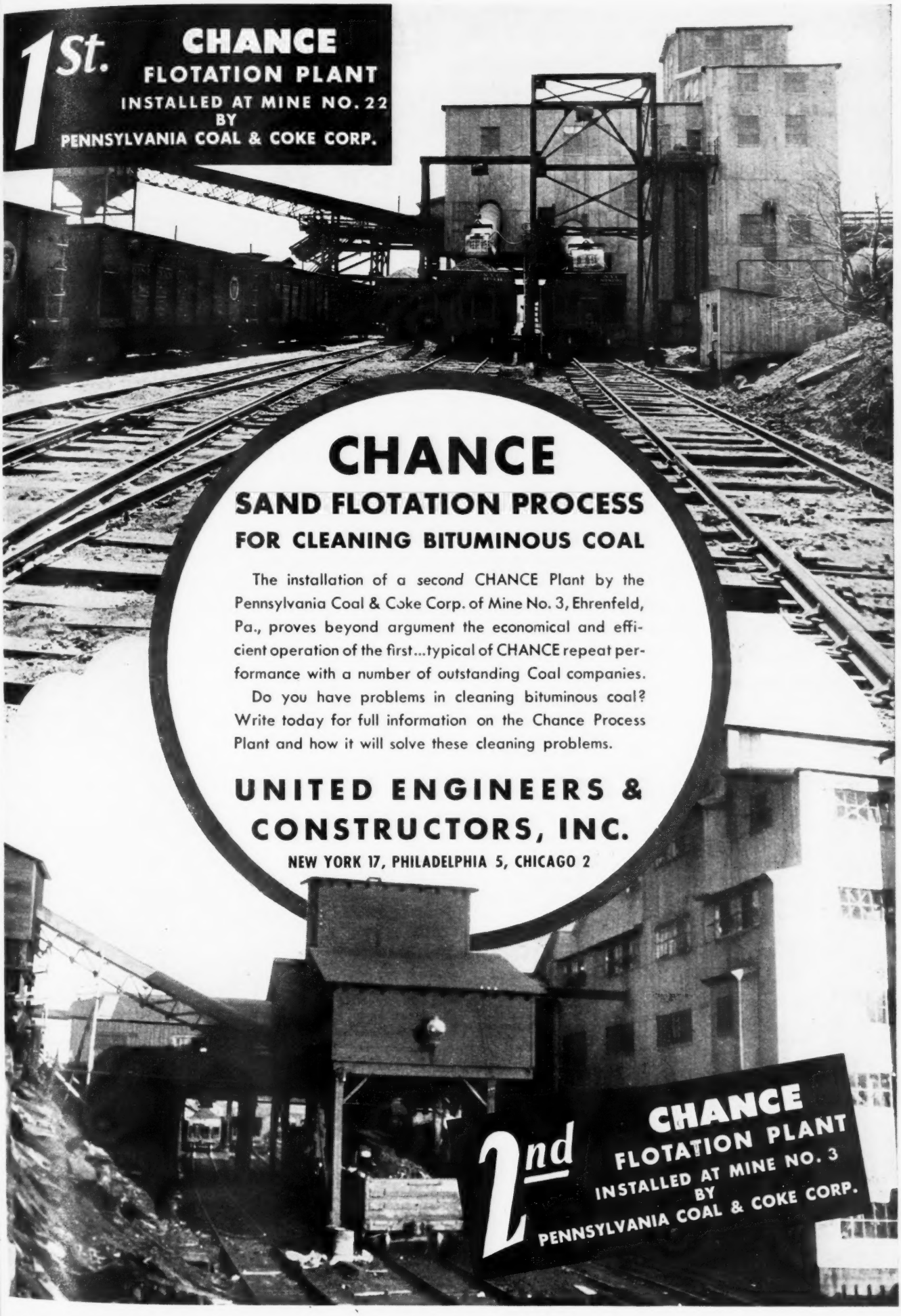
FLORY HOISTS



Manufacturers of Steam, Electric and Gasoline Hoists of all types; also parts for all model Flory Hoists.

FLORY MANUFACTURING CO.
BANGOR, PENNSYLVANIA


1St. CHANCE
FLOTATION PLANT
INSTALLED AT MINE NO. 22
BY
PENNSYLVANIA COAL & COKE CORP.
CHANCE
SAND FLOTATION PROCESS
FOR CLEANING BITUMINOUS COAL
The installation of a second CHANCE Plant by the Pennsylvania Coal & Coke Corp. of Mine No. 3, Ehrenfeld, Pa., proves beyond argument the economical and efficient operation of the first...typical of CHANCE repeat performance with a number of outstanding Coal companies.
Do you have problems in cleaning bituminous coal? Write today for full information on the Chance Process Plant and how it will solve these cleaning problems.
UNITED ENGINEERS & CONSTRUCTORS, INC.
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2nd CHANCE
FLOTATION PLANT
INSTALLED AT MINE NO. 3
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PENNSYLVANIA COAL & COKE CORP.

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for saving manpower now, and safeguarding your postwar costs...

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CENTRO-MATIC LUBRICATING SYSTEMS

enable one man to lubricate all bearings in a fraction of the time it would take several men to contact each individual bearing on production machinery.

Lincoln Centro-Matic Systems consist primarily of a number of injectors—one for each bearing, connected to the bearing by tubing, and individually adjusted to discharge the exact amount of lubricant required.

Injectors may be mounted singly at each bearing, or grouped in manifold at one location, and supplied with lubricant under pressure in either case from a single supply line. Lubricant is pumped to the injectors from a central pumping unit which can be hand-operated or either push-button or time clock controlled.

Lincoln Centro-Matic Systems are easy to install and will help increase plant efficiency, not only today, but for years to come.

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BACK THE ATTACK—BUY MORE WAR BONDS

LINCOLN ENGINEERING COMPANY

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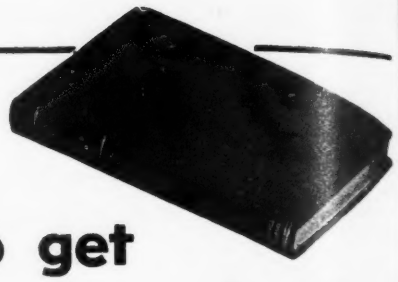

How to get peak coal production

from your mechanical-loading equipment

Here are the most efficient methods of using various types of loading machines, conveyors, scrapers, and certain special equipment, in the loading and handling of coal underground, now presented in a readable, thorough, and practical treatment.

Mechanical Loading of Coal Underground

By IVAN A. GIVEN

EDITOR-IN-CHARGE, *Coal Age*

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THIS practical manual thoroughly discusses the various types of equipment used in slope-sinking, entry-driving and development work, and in production of coal from the usual or regular working sections—details the methods suited to or used with the various types of equipment and under various seam thicknesses and natural conditions—tells how machines are best installed, where they can fill in for other types of equipment, what to do to get biggest production from equipment.

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CONTENTS

1. Mechanical - Coal - loading Principles
2. Mechanical - Coal - loading Essentials
3. Types of Mechanical-loading Units, Characteristics, Crews, Unit production—Hand-loaded Equipment
4. Types of Mechanical-loading Units, Characteristics, Crews, Unit Production — Self-loading Equipment
5. Slope-sinking and Development with Mechanical-loading Equipment
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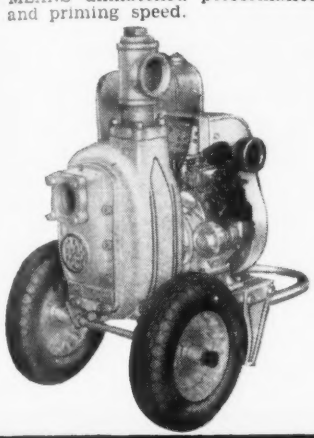

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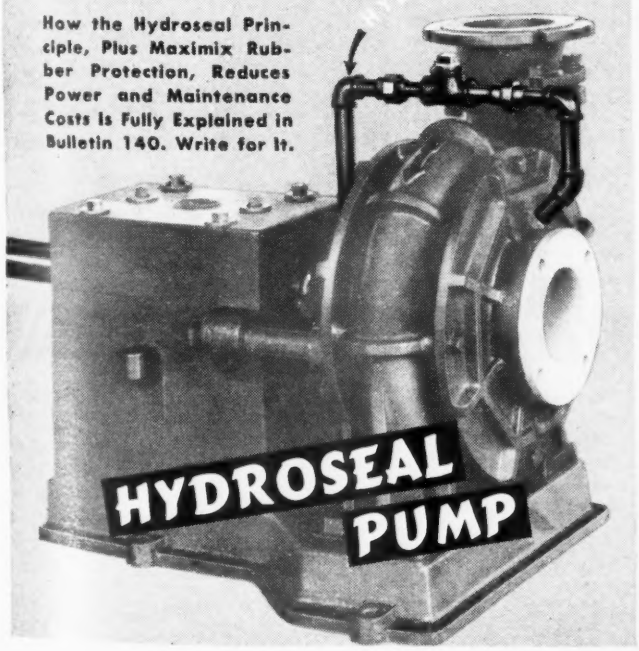

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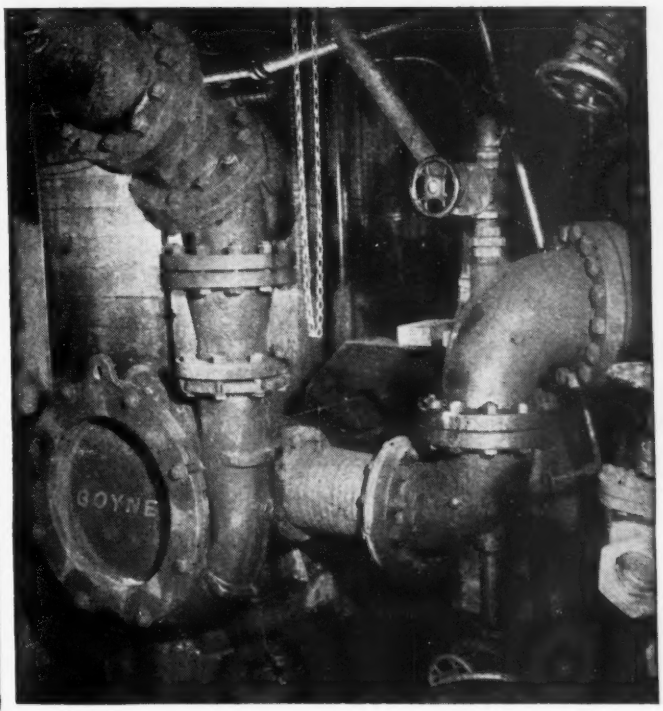

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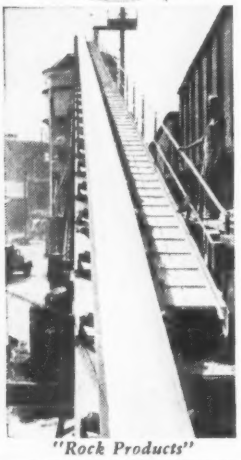

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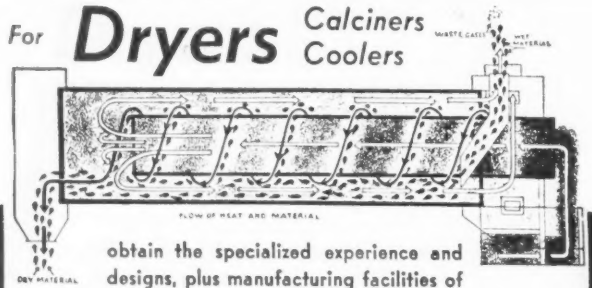

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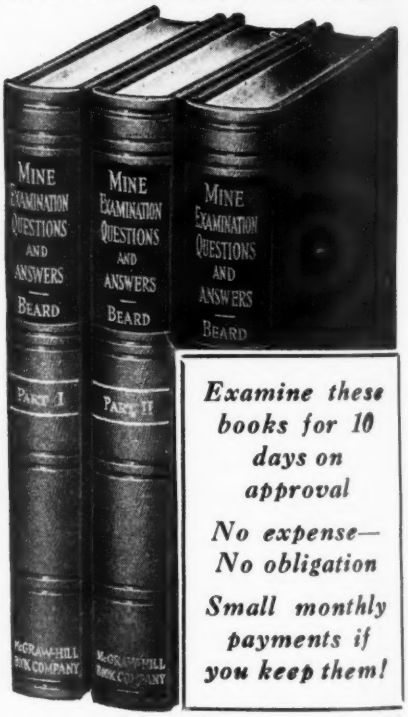

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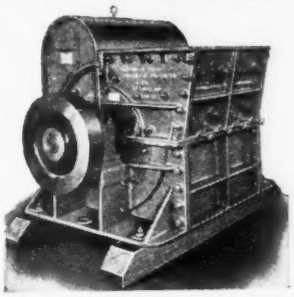

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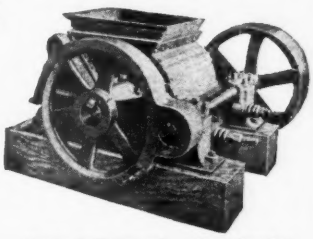

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125	Al. Ch.	435	S.R.	MI-25 cy.
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TRANSFORMERS—1 ph. 60 cy.

No.	Kva.	Prl.	Sec.	Make
1	250	2300	460	G.E.
1	100	2200	110/220	G.E.
3	100	6600	550/440/220	Pgh.
3	50	11430/6600	550	Al. Ch.
3	50	6600	575	G.E.
3	50	Westg.	4000/2200	230/460
1	37½	2300	220/440	Wagner
3	37	4400	185	West. (Rotary)
35	10	2200	110/220	G.E.
100	7½	2200	110/220	G.E.
75	5	2200	110/220	West.

SLIPRING MOTORS—3 ph. 60 cy.

HP	Make	Type	Volts	RPM
300	Westg.	CW-1106	2200	580
250	Westg.	CW	2200	345
100	G.E.	I	220	450
100	Westg.	CI	220/440	1750
75	Cr. Wh.		220/440	875
60	Triumph	C-16	220/440	430
60	Westg.	HF	2200	690
53	G.E.	I	220/550	1165

HOISTS

100 HP, Lidgerwood 2 drum AC or DC Motor.

DINGS MAGNETIC CONVEYOR PULLEY

24" D 2" F 250 v. approx. wt. 3000 lbs.

SCALES

9—Howe No. 2734, 3 beams (2 at 200 lbs.—1 at 50 lbs.) Platform 14½ x 22", cap. 500#.

DIESEL ENGINE GENERATOR SET

1—75 KW, 250 v. DC, type SK Westg Gen. belted to 100 HP Buckeye Horiz. Diesel Engine, complete with swb.

230 V. DC MOTORS

HP	Make	RPM	Type
30	Westg.	1150	SK-110L
35	Westg.	675	SK-140
125	Morg. Gardner	425	———
150	G.E.	500	MPC-6
150	Cr. Wheeler	625	CCD
200	Cr. Wheeler	477	CCD
250	Cr. Wheeler	200/400	CMC
300	Otis	550	———

(With spare armature)

MOTOR GENERATOR SETS

150 Crocker Wheeler 250 v. D. C. 600 rpm., 200/400 or 2300 v. Syn. Motor.
150 KW Ridgeway 250 v. DC, 900 rpm., 2200/3/60, syn.
100 KW Westg. 250 v. DC, 327 rpm., 2200/220 or 440 v., 3/60, syn.

DUQUESNE ELECTRIC & MFG. . . . . PITTSBURGH (6), PA.

ROTARY CONVERTERS

500 KW G.E. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V., Transformers.
500 KW AL-CH SYN. 275 V. 60 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V., Transformers.
500 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V., Transformers.
300 KW G.E. SYN. 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
200 KW G.E. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.
150 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.

MOTOR GENERATORS

200 KW G.E. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.
200 KW G.E. IND., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.
200 KW R.W. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, 80% P.F. Manual Switchgear.

LOCOMOTIVES

13-T WESTGHE., 250 V., 908-C Mts., 36"-44" Ga.
10-T WESTGHE., 250 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHE., 500 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHE., 250 V., 906-C Mts., 36"-44" Ga.
8-T WESTGHE., 500 V., 906-C Mts., 36"-44" Ga.
8-T GEN. ELEC., 250 V., 839-L Mts., 36"-48" Ga.
6-T WESTGHE., 250 V., 904-C Mts., 36"-48" Ga.
5-T ATLAS, 250 V., 823-A Mts., 36"-42" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

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Incorporated

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SPOT CASH

For complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

Frank J. Wolfe

FOR SALE

LOCOMOTIVES

2—15-ton Goodman
1—15-ton Jeffrey
1—13-ton Goodman
2—10-ton Goodman
2— 8-ton Goodman
2— 8-ton G. E.
3— 8-ton Jeffrey
3— 6-ton Goodman
5—6-ton G. E.

ABOVE LOCOMOTIVES COMPLETELY REBUILT

ELECTRIC HOISTS

1—1300 H.P. Double Drum, cylindro-conical drum, 900' of 1¼" rope, 2300 volt.
1—500 H.P. Double Drum, 1600' of 1¼" rope, 2300 volt, Ward
1—400 H.P. Slope Hoist, 8500' of 1" rope.

MISCELLANEOUS

2—Joy Elevating Conveyors for loading from conveyors into mine cars.
Motor Generator Sets
Rotary Converters
Steel Tipples

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COAL MINE EQUIPMENT SALES COMPANY

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MINE EQUIPMENT

100 Kw Gen. Elec. Rotary 250/2300 V
6600, 2200 & 440 Volt Transformers
24"x20" Jeffrey 2 Roll Coke Crusher
18"x30" McLanahan Coal Crusher
50 Hp Lidgerwood Double Drum Hoist
R113 Mine Locomotive Controllers
270 GPM Synch. Mtr. Driven Pumps
600 GPM D.C. Mtr. Deep Well Pumps
350 HP 3/60/2200 V Weco S.R. Motor
250 Hp 3/60/2200 V Weco S.R. Motor
200 HP 3/60/2200 V Geco S.R. Motor

Large Stock—A.C. & D.C. Motors
Switchboards Built to Order

John D. Crawbuck Co. Zone 22 Pittsburgh, Pa.

SALE or RENT

LOCOMOTIVES

1—American 41 ton, 4 wheel, saddle tank, Locomotive, electric lights, steam brakes, ASME boiler, 190 lbs.
1—Lima 80 ton, 6 wheel, Switcher with tender, National Board boiler, 200 lbs. working pressure, superheater, automatic lubrication; excellent condition, immediate delivery.

LOG TYPE STONE WASHER

1—Allis Chalmers 25 ft., heavy duty, Hutch type, Log Washer with steel tank, ⅜" plate, with 2 logs with paddles, 35" dia.

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Lansdowne Theatre Bldg. Lansdowne, Pa.
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1—200 KW, G.E., Rotary Converter
3—165 KVA, G.E. Rotary Transformers
A.C. & D.C. Rotary Control Panels
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Oil & Air Circuit Breakers
1—1/R Portable Air Compressor
Motors: A.C. and D.C.
6—600 Ampere DB-257 Line Contactors
Power, Distribution & Current Transformers
150—5 Ampere, 110 Volt, 2 Wire Meters
3—S & C Oil Filled Fuses with Supports
1—24 Circuit Control Breaker Panel

R. H. BENNEY EQUIPMENT COMPANY

NORWOOD (12), OHIO

SEARCHLIGHT SECTION

SHOVELS and CRANES

Conway Mucker "75", 36" gauge
2—Conway Muckers "50", 36" ga. rebuilt
Marion Model 92 Steam Shovel 5 yds.
Marion Model 37 Steam Shovel, 1¾ yds.
Koehring 301, ¾ yd. Shovel & Crane
Lorain 30 Shovel, Crane & Backhoe
P & H Model 600 Crane
Buc. Erie Steam Dragline, 6-8 yds. 175' bm.
Buc. Erie Steam Crane, Model 30B, 40' bm.
Moore Speedcrane 15 tons, gas, 63' boom
Michigan Crane, Shovel & Backhoe
Speeder ½ yd. Crane and Backhoe
General ½ yd. Diesel Crane
Bay City ½ yd. Shovel
Marion Model 32 Steam Shovel, 1½ yds.
Ind. Brownhoist Crane, gas, 40' boom 1 yd.
Brownhoist Loco. Crane 35 tons, steam
Allis Chalmers "L" Tractor with bulldozer
Cletrac FD Tractor with bulldozer. Rebuilt.
Cletrac FD Tractor with Heil 12 yd. Scraper & Bulldozer
Cletrac FD Tractor with 12 yd. Heil Scraper
Scraper-Wagon, Heil 12 yard
TD9 Tractor with bulldozer
Allis Chalmers "30" Tractor with bulldozer
Mundy 35 H.P. double drum gas Hoist
Stroudsburg 25 H.P. double drum gas hoist
National 100 H.P. dbl. drum Dragline Hoist, elec.
American 75 ton Locomotive, steam. Rebuilt
American 50 ton Saddle Tank Switcher
American 45 ton Saddle Tank Switcher
Whitcomb 14 ton, 36" gauge Diesel Loco.
Davenport 10 ton, std. gauge, gas Loco.
Vulcan 8 ton, std. gauge, gas Loco.
Vulcan 6 ton, 36" gauge, gas Locomotive
Steel Storage Bin 200 tons, ¾" plating
I. R. 1302 CFM., 2 stage Air Compressor
I. R. 1050 CFM., 2 stage Compressor, gas drive
Bucket elevator, continuous belt type, 22" buckets, 4 x 18 Revolving Screen
Hayward 1 yd. Clam, rehandling Bucket
Haiss ¾ yd. Clam, rehandling Bucket
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Blaw-Knox ⅞ yd. Clam, digging Bucket
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1—One **NORDBERG Hoist** No. 06392, 4 ft. drum, hydraulic brake direct connected 150 h.p., G.E. motor AC, 440 v. 3 ph. 60 cycle, speed 585, complete with panel board and ammeter.

3—One **POMONA Vertical Pump,** 75 h.p., AC, 250 v. 60 cy. 3 ph. Westinghouse motor, together with starting compensator, capacity 1000 gal. per min., 200 feet head.

4—One **ALLIS CHALMERS Pump,** type BS 13406, 100 h.p., motor AC, 200 v. 60 cy., 3 ph., capacity 1000 gal. per min., 250 feet head.

All of the above equipment in first class operating condition

FS-200, Coal Age
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Slip ring, 125 H.P., F-M, 3 Ph., 60 Cy., 440 V., B/B, 1750 RPM; with drum type controller and resistance. Very attractive price.

The Industrial Equipment Corp.
P. O. Box 1647 Pittsburgh 30, Pa.
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1—Ottumwa double drum, single gear reduction Electric Shaft Hoist, complete, in first-class condition, with 60 horsepower, 600 revolution, 220 volt, 3 phase, 60 cycle, General Electric motor.

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DINGS MAGNETIC PULLEY

New equipment—Never been installed.
Size 24" D x 32" F—250 Volts.

AMERICAN ZINC COMPANY
OF TENNESSEE
Paul Brown Building St. Louis, Mo.

CURRENT SPECIALS

One—Lidgerwood—General Electric Mine Hoist 3 Step 6 to 8 ft. double conical drum Herringbone reduction to 300-450 HP 3 phase, 60 cycle, 2200 volts, General Electric slip ring motor complete with A. C. magnetic controller, power brake, etc. Rope speed 700-800 ft. per minute. Rope size 1¼ inch. Price $8500.00

Two—150 H.P. Brownell boilers. Fire tube 6 x 20 approved for 110 lbs., subject inspection and prior sale $750.00 each.

One—Sullivan C67 mining machine, 3-60-220 volt, tip turn truck, cable, etc.—Subject inspection and prior sale, $1050.00.

Two—562 KW Allis-Chalmers turbo-generators, 3 phase 60 cycle 2300 volt, complete with condensers, piping, valves, wiring and switchboards. Price $10,000.00 per unit, subject inspection and prior sale.

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300 CFM Chi. Pneu. with 75 H.P. motor
526 CFM Ingersoll-Rand, Style "JC"
940 CFM Ingersoll-Rand 10 horiz. 3-st. steam driven with receiver

CRUSHERS

24" x 54" Superior Crushing Rolls
#3 McCully Gyratory
#6 McCully Gyratory

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1—20 H.P. Northern G.E. Type 220 V D.C. 1000 RPM, complete with drum controller
1—22 H.P. G. E. Type ITC 5011, 720 RPM, 3/60/440
2—37 H.P. Otis Elevator, Type 90219, 1140 RPM, 3/60/440
4—40 H.P. G.E. Type MTC 5522, 1200 RPM, 3/60/440
1—50 H.P. Thomas Elevator, Type 1-12-35, Form M 600 RPM, 3/60/440
1—100 H.P. Northern G. E. Type, 220 V D.C., 475 RPM, complete with drum controller
8—American Hoist & Derrick Co. double drum, motor driven with 40 H.P. A.C. motors

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225 Bucyrus 80 ft. Boom, 54 ft. Dipper Stick, Steam Shovel.

2-4 Yds. SHOVELS

2 Marion Model, 125, Electric, 35' Boom. 25' Dipper Sticks

16 YD. DRAGLINE:
1—16 Yd. Electric Caterpillar Modern Dragline with 160' Boom

AIR COMPRESSORS:
(7) Steam 66 ft., 304 ft., 600, 1000 & 1940 ft.
(12") Belted, 360, 676, 870, 10000, 1300 ft.
(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2000, 5000 ft.
(14) Gasoline, 10, 160, 220, 310 & 370 ft.

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1000' 60", 600' 30", 300' 20", 1000' 42", 900' 48", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14".

TANKS:
12,000 and 15,000 gal. and 20,000 gal.

CONVEYOR PARTS:
Idlers, Heads & Tail Pulleys, Steel Frames, Tripper, etc., 14 In., 6 In. Large stock here.

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2½ ton Witeomb 24 ga. New Batteries
2—4 ton G.E. 30 in. ga.
3—5 ton Mancha 30 in. ga.
4—5 ton G.E. 36 in. ga.
2—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.

TRACK SCALE:
150 Ton Buffalo 56 ft. R.R. Track Scale

TROLLEY LOCOMOTIVES:
2½ ton Westinghouse 24 ga.
4—6 ton & 3—5 ton Goodman 36 ga.
3—6 ton Goodman 30 ga.
4—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
2—8 ton Goodman 36 ga.
10 ton Goodman 42 ga. & 13 ton Jeffrey

VIBRATING SCREENS:
9 Tyler Hummer 3x6,4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex

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SHOVELS, CRANES & DRAGLINES:
1 yd. K 30 Link Belt 50' Boom Crane
2 yd. Page 70' Boom Diesel Dragline
1¼ yd. Marion 450 Elec. Shovel
1½ yd. Lima Diesel Shovel & Dragline
25 ton Browning 50' Boom Loco. Crane

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Junior Joy 36 ga. Low Pan
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7 Conway 20A, 30A, 50A, 60 & 75 Muckers

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ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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"A" WIDTH All Sizes | "D" WIDTH All Sizes
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FIRE HOSE

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EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

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RUBBER HOSE

WATER HOSE

I.D. Size	Each Length with Couplings Attached Length	per Length
¾"	25 feet	$4.25
1"	50 "	8.00
	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

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Goodman: All 250 volts.
1—10 ton, 31-1-4-T.
1— 6 ton, 30B, 48" 1—5 ton.
1— 5 ton, W-1-2, 36".
1— 5 ton, 10-30.
2— 4 ton, 2600 K.
1— 6 ton, 32-1-4-T.
2— 8 ton, 32-1-4-T.

Westinghouse: All 250 volt.
1—4 ton, 902, 48" 1—18 ton, 102, 42"
1—904 c. 44" 500 volt. Also 906 motors.
1—10 ton, 915.

G.E.: All 250 volt. 4 ton 1022, 44", as is
6 ton 803, 44", as is 5 ton 825, 44"
6 ton 823, 44" 8 ton 839 motors
6 ton 801
8 ton 839

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt
1—Jeffrey MH 110 Locomotives
1—Jeffrey MH 100

MINING MACHINES

Jeffrey, 35B and 4—28A, 250 V.
Goodman, 12A, 12AB, 12AA, 12G3A, 34B.
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA,
3—124AA.
Sullivan. CE7, CE9, CE10, CR10 Low Vein.
4—29B arranged for bottom cutting at bargain prices.

SUBSTATIONS—275 volts, D. C.

2—200 KW **G.E. Rotaries** (600 volt)
1—200 KW **Ridgway** M.G. Set.
1—200 KW **G.E.** Rotary Converter.
1—200 KW **West.** Rotary.
1—150 KW **West.** Rotary.
1—200 KW 1—100 K **Ridgway** M-G Sets.
1—150 KW **Ridgway** Rotary.
1—150 KW **West.** Rotary-converter.
1—100 KW **West.** M-G Sets.
1— 90 KW **G.E.** Rotary.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, MH 88, 29B, 35B and 28A. Goodman 34B, 30B, 30C, 12A, 12AB, 12AA 33-1-4-T, 31-1-4-T. **General Electric** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature,** 250 V. Bracket Type, 150 KW G. E. HCC Bracket Type, and 150 KW G. E. TC Pedestal Type.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll) 12"x16", single roll 24"x36", 36"x36" CONVEYOR HOISTS, 24"x24" and 18"x16" * TURBO-GENERATOR 500 K.W. 275 volt DC * ROPE & BUTTON CONVEYOR 400' long LATHES, SHAPERS * SWITCHES * AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps * MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps * HOISTS, overhead, AC, 3-60-440, 1 ton and 2 ton * CAR RETARDERS, Fairmont * 1 Clam shell bucket 1¾ cubic yard, 1—Figure 8 drum * MINE CARS 22" high, 44" gauge * 2 SULLIVAN BIT SHARPENERS * R.R. SWITCHES 65# to 100# HOISTS 5 HP AC and DC. GENERATORS DC 250-275 volt, 30 KW to 100 KW. Also 50 KW 125 volt direct connected to steam engine. Goodman Scraper Loader.

GUYAN MACHINERY COMPANY, Logan, W. Va.

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Mr. Traffic Man:

Your own owned CARS!

Demurrage, Avoidable Labor Expense, Extra

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Consider, also, benefits from MOBILE "Storage"!

Which of these cars could *you* use?

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25, Box, 36-Ft., 40-Ton; Steel Ends
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150, Tank, 8000-Gallon, 40-Ton & 50-Ton

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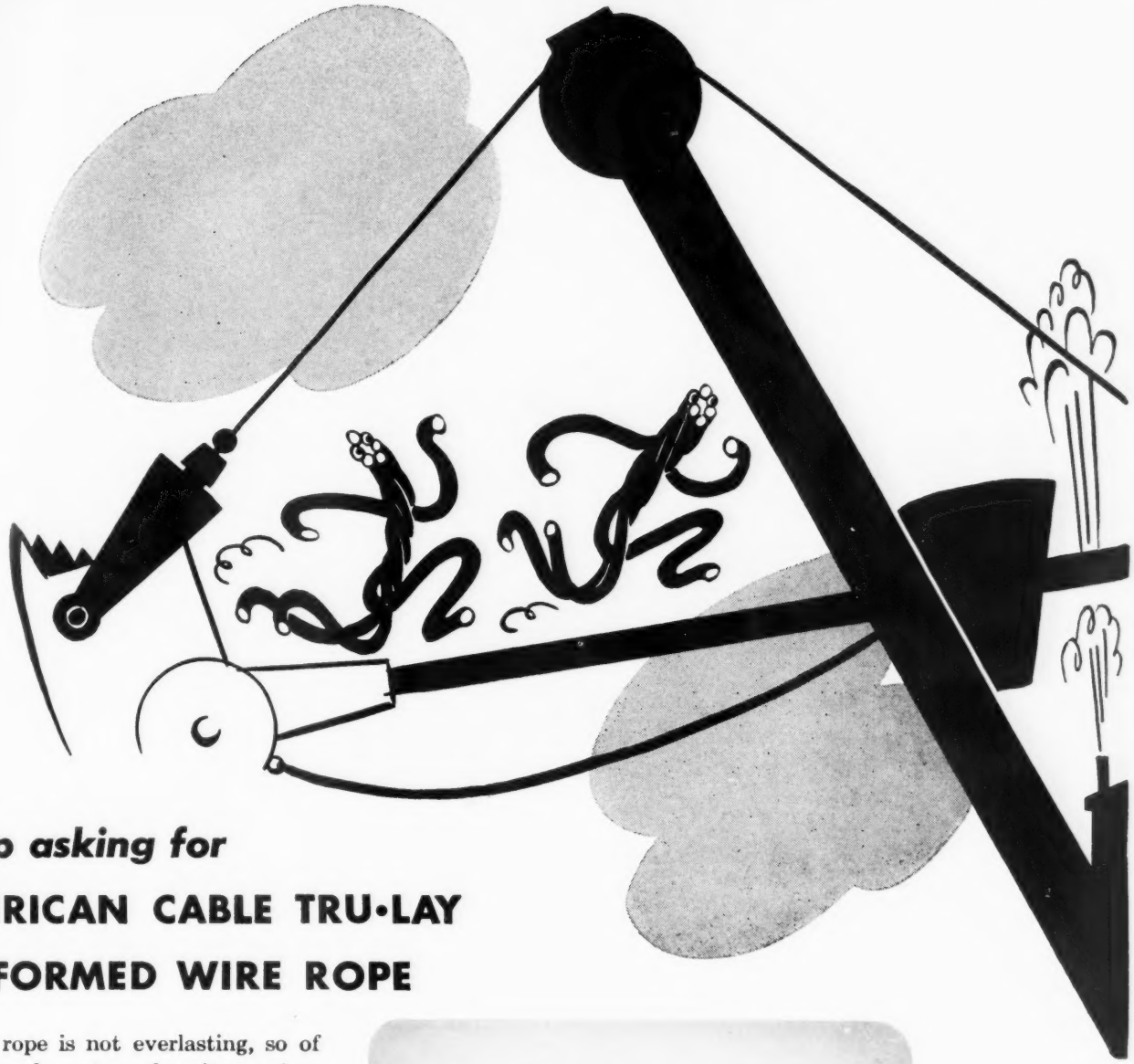

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